Unchecked Government Output Costs Millions

By E. Drake Lundell Jr.
Of the CW Staff

WASHINGTON, D.C. – Government computer applications routinely churn out checks, pay bills and make requisitions for more than $40 billion annually – and no one seems to be checking that the output is correct.

At least that's the conclusion of a report the General Accounting Office (GAO) recently submitted to Congress.

While the agency did not quantify the dollar amount that errors in such applications cost the taxpayer, it indicated they run into the "tens of millions of dollars" each year.

"Federal agency computers cause more than 1.7 billion payments and other actions a year without anybody reviewing or evaluating whether they are correct," the GAO report stated.

These payments can be wrong because of both software problems and poor data quality, the report noted.

"Computer actions are only as good as the computer programs (or software) that make the computers operate and the data within the system," the GAO said, adding that "computers can cause incorrect actions if these factors are wrong.

"The result is overpayments and unnecessary or premature costs," the agency added.

Coins New Term

Coining a phrase to cover these routine applications, the GAO called them "automated decisionmaking applications" and defined the term as "computer programs that initiate action (through output) on the basis of programmable decisionmaking criteria established by management and incorporated in computer instruction.

(Continued on Page 5)

NEWSPAPER

THE NEWSWEEKLY FOR THE COMPUTER COMMUNITY

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IBM Decries Justice's Use of FBI as 'Coercive'

By Nancy French
And Edith Holmes
Of the CW Staff

NEW YORK – The government's use of the Federal Bureau of Investigation (FBI) to interview people who will be called as witnesses by IBM in the current antitrust trial is "coercive," "unconstitutional" and an abuse of government power.

So charged IBM's lead attorney in a recent closed-door meeting with Judge David N. Edelstein, who is hearing the case.

In fact, Thomas D. Barr said, the use of the FBI by the government "impinges on IBM's fundamental right to a fair trial," and he picked up impressive support from two former U.S. Attorneys General during the resulting donnybrook (see related story on Page 3).

In the closed-door meeting with Edelstein and in papers filed afterward, the government stated it intends to go forward with the interviews unless required by the court to suspend them.

Raymond M. Carlson, the government's lead attorney, defended the use of FBI agents in the case as "normal and customary" and accused IBM attorneys of seizing the issue as a means of "continuing its effort to make it difficult for the government to try the case in an orderly fashion."

Requesting FBI agents to interview witnesses is "the most efficient use of facilities and manpower available to us," Carlson said.

"In my 27 years of litigation of this kind, at least two-thirds of such interviews have been conducted in whole or in part by FBI agents," he added.

FBI agents, who are largely lawyers or accountants, are "skilled and discreet" in conducting interviews and investigations; they have been doing that kind of support work for the Justice Department's Antitrust Division as well as its Criminal Division for many, many years, the government attorney said.

Carlson, who described the U.S. vs. IBM antitrust case as "protracted" and a "drain on the public resources," said his staff cannot do without the FBI agents' assistance, and any interference with their use would be tantamount to "tying the

(Continued on Page 4)

U.S. Halts FBI Use Until Edelstein Rules On Constitutionality

By Edith Holmes
Of the CW Staff

NEW YORK – The U.S. government agreed late last week to temporarily suspend its use of Federal Bureau of Investigation (FBI) agents to interview IBM witnesses until the district court judge hearing the U.S. vs. IBM antitrust case here can decide on the constitutionality of employing the FBI in this way.

The Department of Justice, which is prosecuting the government's case, entered into a voluntary stipulation with IBM to halt the interviews begun at the end of April with the understanding that IBM's attorneys will not seek intermediate appeal of Judge David N. Edelstein's decision if it permits the government to continue to use the FBI.

IBM counsel also agreed the corporation would not block a government appeal should Edelstein decide the use of FBI agents to interview trial witnesses is unconstitutional and a violation of IBM's right to a fair trial.

For his part, the judge pledged to the parties he will reach a decision on the matter within seven days after he has the government's papers answering IBM's motion to put an end to the practice.

At last report, the government expected to have its papers before Edelstein by tomorrow.

CW Photos by R. Frank

The Central Maine Power Co.'s DP shop was caught in the middle last week when two bombs wrecked a room on the floor above it (top photo) and a room on the floor below it. The shop itself (bottom photo) suffered only "shock damage."

Two Bombs Rock Maine Utility

By Ronald A. Frank
Of the CW Staff

AUGUSTA, Maine – Two powerful explosive devices were detonated on floors above and below the DP center of the Central Maine Power Co. (CMP) here last week, but the computer installation remained intact.

The bombs contained sophisticated timing and ignition mechanisms; the closest device exploded "within 50 feet" of the utility firm's DP center, according to officials from the Federal Bureau of Investigation (FBI).

Even if the installation had been knocked out, DP operations could have continued by utilizing backup plans, according to Raymond Pelletier, CMP DP manager.

In addition to storing its data files at an alternate location, the company has made

(Continued on Page 6)

FCC Bureau Chief Hits AT&T Lobbying Effort As 'Highly Distorted'

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. – AT&T lobbying has given members of Congress an unbalanced picture of the intent of the Consumer Communications Reform Act of 1976, according to Walter Hinchman, chief of the Federal Communications Commission's (FCC) Common Carrier Bureau.

The lobbying effort "has been highly distorted and, while some of the data that has been presented has superficial appeal, when you look behind that data it is not really solid," Hinchman said in a recent interview.

The AT&T-fostered bill, introduced by Rep. Teno Roncalio (D-Wyo.), would amend the Communications Act of 1934 by severely limiting the FCC's power to authorize the operation of specialized common carriers (CW, March 22).

The FCC is "not going to do any lobbying since we are actually an arm of Congress, but we are going to respond to questions to present information for the record," Hinchman said.

If the proposed legislation comes up for a hearing in Congress, then the FCC will "definitely put on the record what we think the facts are," he said.

The FCC has not exceeded its authority

(Continued on Page 6)

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Misinterpreted Record Code

Jail Suicide Blamed on Terminal Operator

By Nancy French
Of the CW Staff

YONKERS, N.Y. The jail suicide of a 20-year-old man here has been blamed largely on a police communications employee who "misinterpreted" a standard National Crime Information Center (NCIC) computer code.

But three other factors also contributed to the youth's death – insufficient training of police communications employees, an improperly canceled warrant and NCIC's practice of retaining cleared warrants in its data base, according to Eugene Fox, counsel for the city of Yonkers, and Lt. John Duffy, the police officer who investigated the conduct of the policemen involved.

Steven Karagianis was found dead in his cell one and one-half hours after he was arrested by Yonkers police officers on a warrant for probation violation that had been canceled a month earlier [CW, April 26].

The civilian communications employee on duty in the police station when the youth was arrested was a former Marine Corps teletypewriter operator with only 16 hours of training in communications at the Yonkers Police Department, Duffy said.

The operator read an NCIC record coded "CW" as "Current Wanted" (no such code actually exists) rather than "Cleared Wanted." Instead of checking with superiors who could have helped him, he radioed incorrect information to a police cruiser, the investigation found.

Duffy, who heads the Yonkers Police Department's Internal Affairs Division, explained the sequence of events on the night of the suicide as follows:

At 11:24 p.m., Karagianis was stopped for going through a red light. In accordance with routine procedures, the police officer who stopped him radioed the communications operator for a record check on the automobile and driver.

Using the New York State Police information network, the communications operator requested an "R and All," or "record and all other information," Duffy said. New York State's criminal justice computer had no record on Karagianis, nor did the Department of Motor Vehicles, he added.

The response from NCIC showed an active warrant, however; it was coded "CW," meaning the wanted individual had been apprehended, action had been taken and he was no longer wanted.

Operator Wrong Twice

The communications operator misinterpreted the message and radioed inaccurate information to the cruiser; the patrolmen brought Karagianis in.

Since the youth protested so strenuously that the warrant had been canceled, the operator was instructed to resubmit the inquiry, but the same messages came back.

"He misinterpreted the NCIC message the second time the same way he did the first time," Duffy said.

The improper cancellation of a warrant was also cited in the investigation report.

Karagianis, who had been serving five years' probation for a minor marijuana offense, was picked up a second time last November and charged with violating probation.

He appeared in Westchester County Court in January, at which time the charge was dismissed, and the warrant should have been canceled – not just cleared and left in the NCIC data bank, according to Duffy.

Karagianis' attorney, Jeremiah Gutman, became aware the warrant had not been canceled when police came looking for the youth on March 4. On March 5, the attorney wrote a letter to the Sheriff's Department; records indicate the warrant was cleared but not canceled on March 9.

Rather than sending the clear order to the attention of the Yonkers Police Department, however, the notice was sent as an "all points bulletin," which was overlooked in the yards of generalized teletypewritten messages the Yonkers Police Department receives each day, Duffy found.

When Karagianis was arrested, the police actually had both the warrant and the notice, but the two had not been matched up, according to Fox.

New training classes have begun at the Yonkers Police Department to review all NCIC codes and procedures, according to Duffy, and disciplinary action is expected to be taken against the communications operator.

Death Spurs NCIC Policy Change

WASHINGTON, D.C. – The Federal Bureau of Investigation's National Crime Information Center (NCIC) will purge records on a wanted person from its computerized data bank as soon as the warrant for his arrest is cleared by local law enforcement officials.

That decision came as the direct result of a case in which a 20-year-old Yonkers, N.Y., man committed suicide after being picked up and jailed on a warrant that had been cleared. A communications officer misinterpreted the code on the NCIC record. (See accompanying story.)

According to a notice sent to all NCIC participants, warrants formerly coded "Cleared Wanted" will now be treated the same as canceled warrants to prevent local law enforcement agencies from taking "inappropriate action" on such records.

Canceled warrants have always been purged from the NCIC's data bank immediately; however, warrants that were cleared – nullified by police departments rather than by a judge – were formerly retained for 30 to 60 days.

All "Cleared Wanteds" were purged from the NCIC system late last month; the center has instituted programming changes to purge future "Cleared Wanteds" immediately after they are entered, the spokesman said.

Before the NCIC became a nationwide network, officials thought "Cleared Wanteds" should be temporarily retained in the system to keep local law enforcement agencies up to date on cases they might be investigating, a spokesman said.

On the Inside This Week

NEWS
Intracompany Memos Cited as Pitfall in Contract Suits 7
Societies/User Groups: Calendar 8
Minn. Governor OKs Privacy Law's Second Amendment ...8
Computerized Nations Seen More Vulnerable to War 11

EDITORIAL
Editorial: Backing Bell Blindly 12
White Hat, Black Hat: Repairing the Damage 13
Standard Format Encourages Accurate Documentation ...13

SOFTWARE & SERVICES
Remote Translation Puts New Life in Old Programs 15
'Shorthan' Eases Initial Cobol Coding 16
Codasyl Report Explains Choice of DBMS Ingredients ...17
Aim at Areas With High Payoff for Users, Managers 19
Current Accounting Data Handled on Mini With 'Midas' ..22

COMMUNICATIONS
DDS Less Costly Than Proposed MPL: AT&T Official 23
WUIS Enhances C-2100, Adds RLAs 32

TERMINAL TRANSACTIONS
Incoterm Adds Two Series Featuring 3270 Emulation 24
'Intelligence' Smooths Emergency Room Procedures 27
Tektronix System Handles Refresh, Storage Graphics 29

SYSTEMS & PERIPHERALS
Criterion Extends NCR Peripherals' Life 37
Convenience, Reliability Hallmarks of Data Modules 41

MINIWORLD
Switch From IBM 3 Ends Batch Era for Car Dealer 42
Crime Lab Picks Mini to 'Watch' Evidence 43
Mini Melts Steel Foundry's Electric Bill 44

COMPUTER INDUSTRY
Japan Increases Import of DP Systems 45
Electronic POS Sales to Hit $582 Million in '80: CSI 45
Canadian Service Industry Reaps $211 Million in '74 48
Incoterm Products Reflect User Demand 49
IBM Policy Discouraged Operating Systems Mart: ADR ..50
ADR Claims Software Record With 5,000th Product 51

FINANCIAL
Prime Quarter Earnings Jump Sevenfold 64
EMM Finds First Period 'Encouraging' 64

Ex-Top Justice Officials Agree Department's Use of FBI Wrong

By Edith Holmes
Of the CW Staff

NEW YORK – Several former high officials in the Justice Department last week agreed with IBM that the use of Federal Bureau of Investigation (FBI) agents to interview witnesses in an antitrust case is an improper and potentially coercive practice.

Former Attorney General Ramsey Clark (who originally filed the case against IBM) and Nicholas deB. Katzenbach (who is now IBM counsel) and former Deputy Attorney General Warren Christofer all agreed the practice is wrong in affadavits filed with IBM motions.

"American citizens are encouraged to cooperate with agents of the FBI and commonly associate FBI agents with criminal and security investigations," Clark said.

"Those factors, coupled with the stigma that may be associated with the refusal to cooperate, make the use of FBI agents to interrogate a defendant's prospective trial witnesses in a civil case improper.

"For those reasons, I believe it is a misuse of the FBI to ask its agents to conduct such interviews. I did not contemplate it when I commenced this action nor do I condone it now," he added.

When contacted later, Clark said he sympathized with the Justice Department's concern that it is "grossly outmanned" in the case by IBM.

"If the Antitrust Division lacks the resources to adequately prosecute the case, [it] should be provided an additional or special appropriation to move the case forward," Clark said.

However, using FBI resources is not the way to do it, he added.

Katzenbach, who is now chief of IBM's in-house counsel, and Christofer essentially concurred with Clark.

But, Christofer said, "since I did not participate in the day-to-day operations of the Antitrust Division or directly handle its cases, I cannot say categorically that FBI agents have never been so used.

"What I can say is that if such a practice had been brought to my attention, I would have questioned and opposed it because of the potential for coercion which exists when FBI agents interview a defendant's witness in a civil suit," he said.

And Katzenbach said: "Because of the public association with the FBI with criminal investigations and because of the public interest in encouraging cooperation with FBI agents carrying out their investigative responsibilities, I believe that any use of the FBI to interview a defendant's witnesses in a civil case would have raised a policy issue of sufficient magnitude to have been brought to my personal attention or to the attention of my successor, Mr. Clark, and neither of us would have authorized the use of the FBI in such circumstances."

Observers Call Furor Tempest in a Teapot

NEW YORK – Several observers at U.S. vs. IBM here last week saw the furor that developed over the Justice Department's use of Federal Bureau of Investigation (FBI) agents to interview IBM witnesses as the proverbial tempest in a teapot.

FBI agents were used early in the case to take depositions from witnesses without any protest from IBM, one observer said. After reading those depositions, IBM should be glad FBI agents – rather than antitrust attorneys – were being assigned to question witnesses, he said.

Bureau agents, whose familiarity with the case as well as antitrust theory is limited, "don't know how to ask the right follow-up questions" and therefore extract virtually "harmless" information from the witnesses, he explained.

IBM has been able to turn "the FBI's misdeeds" to its own advantage, another observer said, pointing out the mainframer's staff of expert public relations people wasted no time in getting testimony from the first robing-room conference into the hands of the press.

The issue of the constitutionality of using bureau agents to interview IBM's trial witnesses has served to expose the enmity between the parties that has existed since the days of discovery, another observer said.

Early last week, an IBM attorney standing beneath one of the courtroom's hanging lamps that was buzzing in prelude to burning out quipped, "One of the FBI's bugs must be on the blink."

Witnesses Find FBI 'Intimidating'

By Nancy French
Of the CW Staff

Witnesses scheduled to testify on behalf of IBM in the U.S. vs. IBM antitrust suit corroborated the corporation's view that talking with an agent of the Federal Bureau of Investigation (FBI) is at best an "intimidating" experience.

Several witnesses contacted by *Computerworld* last week refused to talk about the matter without the presence of an attorney or without permission to review their remarks before they appeared in print.

One said he had "put off the agent" who contacted him until he could seek advice from his attorney on the matter.

Another, who felt the experience promised to be an uncomfortable one, nevertheless refused to comment about it for the record because of the implications of saying something negative about the FBI.

Melvin F. Bockelman, manager of the Kansas City Police Department's Data Systems Division, was the only witness who would even discuss the matter.

Bockelman, who is well aware of his rights, was "slightly" acquainted with FBI Agent Robert Harmon who called on him in connection with the case, he said.

Bockelman said he spent about two and a half hours with Harmon and "answered what I felt like answering and didn't answer what I didn't feel like answering.

"It was completely voluntary," he said, "just like when the IBM attorneys were here."

Some of the questions Harmon asked would have taken a lot of research to answer, and Bockelman said he didn't have time to do it.

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Charges Abuse of Power

IBM Protests Use of FBI to Interview Its Witnesses

(Continued from Page 1)

government's hands."

Interviews with several officials both within the FBI and the Justice Department confirmed using special agents to interview defendants' witnesses was customary.

Bruce Wilson, U.S. Deputy Assistant General, called the practice "not unusual." He declined, however, to name any other cases in which FBI agents had been used in this manner, but said he knew of "at least 20 others."

Another Justice Department official who asked not to be identified pointed out that Antitrust Division attorneys would rather interview defendants' witnesses themselves. However, in a case as large as U.S. vs. IBM, the division has no other choice.

IBM has named more than 400 potential witnesses. As a rule, a defendant in an antitrust suit seldom names more than 45, he said.

Ironically, after emphasizing the "routine" nature of the FBI's participation in the case, the Justice Department team turned around and filed a formal motion with the court asking Judge David N. Edelstein for his stamp of approval in light of IBM's objections.

A day later, IBM filed papers opposing the government's action, thus placing before the court the objections its counsel had expressed verbally the day before.

Edelstein denied the government's motion largely on procedural grounds. He stated the government had sought an "advisory opinion" from him which was "neither indicated nor desirable."

At the same time, Edelstein suggested IBM recast the papers it had filed opposing the practice into a formal motion for the court to consider.

The following day, IBM filed papers moving for an order to show case – a procedure demanding Edelstein to rule on the issues as quickly as possible.

In that motion, IBM suggested a decision needed to be reached speedily to prevent further adverse encounters between IBM witnesses and FBI agents.

The defense has asked that the government either stop the practice or impose safeguards on FBI agents to protect the rights of IBM and its witnesses.

In its papers, the government argued it intends to have the FBI interview IBM witnesses who are willing to be interviewed in private and without the presence of IBM counsel. Such interviews are a part of its responsibility to expedite cross-examination, the government said.

In addition to reiterating Carlson's arguments before Edelstein, the papers noted it would be impossible for the 13 lawyers now actively engaged in presenting the goverment's case to travel around the country to prepare the cross-examination of prospective IBM witnesses at the same time.

Attorneys for the defense have stressed they do not question the right of Justice Department lawyers, economists or other paralegal personnel to interview consenting witnesses.

However, they do object to the interrogation of witnesses under "inherently coercive conditions . . . Misuse of FBI agents in this way gives the U.S. government an advantage over the defendant to which it is not entitled under law," IBM said.

Witnesses told defense counsel that FBI agents who contacted them indicated in separate instances that the interviews were court-authorized, that they were approved by the Second Circuit Court of Appeals in New York and that one witness was being contacted by the FBI with IBM's full knowledge and consent.

"We have no reason to believe agents involved intentionally misrepresented the facts. Likewise, we have every reason to believe this type of misinformed but authoritative statement will be continued – the leash is long and the agency's status is impressive," IBM's papers said.

The government's direct case will not be completed for approximately a year, providing more than ample time to interview IBM's witnesses, IBM said.

The IBM papers stated further that use of FBI agents is "unnecessary."

Beyond the 13 attorneys the Justice Department says it has working on this antitrust case, "there are more than 440 lawyers employed by the Antitrust Division and more than 3,000 in the Department of Justice," IBM said.

More than 60 lawyers in the division and the department – apart from Carlson's staff – have already worked on the case.

If the judge will not order the government to stop using the FBI in the case, IBM has asked Edelstein to impose rules for the conduct of FBI agents and the protection of the corporation's trial witnesses.

Among the safeguards sought by IBM are the application of the term "interview" to all communications between FBI agents and IBM witnesses; instructions to agents to inform witnesses about the basis for the interviews and their rights to refuse to be interviewed or have their counsel present; and sanctions assuring information gained in such interviews will be used only for the purpose of this trial and will not be disclosed except at the trial or by order of the court.

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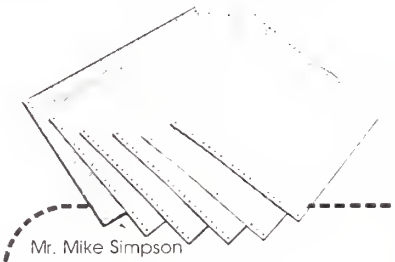

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DEC 310W Could Prove Bargain To TV Watchers in Boston Area

BOSTON – Area users who tune in WGBH-TV next month might be able to get a Digital Equipment Corp. Datasystem 310W at a price better than DEC's.

For the second year in a row, DEC has donated a minicomputer to the public broadcasting station's annual fund-raising auction. The event will be televised June 4-12.

Last year's donation was a $17,000 small business system that went for a high bid of $14,200.

The 310W, valued at $23,600, is a combination word and data processing system. It features a 16K-word PDP-8/A central processor, dual flexible disk drive, 40 char./sec letter-quality printer and VT-52 CRT.

The system includes the COS 310 operating system, which functions under Dibol, and a turnkey text-editing software package.

A 90-day hardware warranty, two days of on-site word-processing training and two weeks of computer training will be offered with the system, which will be delivered immediately to the highest bidder.

DEC's donation is the largest ever received by any of the 55 public broadcasting stations in the country that raise funds with actions, WGBH said.

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Examples Show Loss of Taxpayer Money

WASHINGTON, D.C. – In a report to Congress that effectively concluded no one is watching the government store (see story on Page 1), the General Accounting Office (GAO) included several examples.

The examples illustrate software problems "frequently experienced with automated decisionmaking" and data problems which "can adversely affect the actions directed by automated decisionmaking applications," the GAO said.

The examples were not meant as criticism of the agencies involved, the GAO emphasized, but were included to show "these problems can occur wherever these applications are used."

Army Software Problems Waste $2 Million Annually

Over $2 million a year has been spent unnecessarily and a slew of foul-ups have resulted since the Army "improved" the system it uses to supply overseas customers from U.S. depots, according to the GAO report.

The supplies sent to overseas customers come from several Army inventory control plants. Automated decisionmaking applications screen the availability of supplies at these U.S. depots, then direct the computer to produce an order authorizing the more than 100,000 annual shipments.

When the Army decided to enhance this system in the early 1970s, the control points were instructed to design their DP applications so European customers would receive their orders from East Coast depots and Pacific customers from West Coast depots.

In addition, controls were required to prevent the software from releasing cross-country shipments without manual review.

But things didn't quite work out according to plan, the GAO report indicated. The Army Audit Agency examined the applications in effect at five control points and found:

- The software at four of the points could not handle the maximum filling of requisitions from the appropriate depots.
- At one high-volume control point, the software screened stock availability at eight depots before finding the right one during the initial requisition processing.
- Depots on the opposite coast were often selected to fill back orders.
- Controls to prevent the automatic release of supplies from the wrong depots were not implemented at three control points; supplies were automatically released for cross-country shipments.
- At least two control points used software that existed before the criteria for supporting overseas activities were developed.

The unnecessary spending of $900,000 annually was attributed to unnecessary transportation costs. In addition, $1.3 million has been spent on increased inventory investment.

Some VA Beneficiaries Get More Than Their Fair Share

Incomplete data was the cause of $700,000 in overpayments made to some of the 185,000 veterans who receive monthly checks from the Veterans Administration (VA) for apprenticeship or other on-the-job training programs, according to the GAO report.

The VA application was designed to make payments at a rate that decreases every six months; it assumes the veteran's pay increases as he learns his job.

Programmed to read input documents and distinguish training awards from other types of education benefits, the application refers to specific rate tables to determine each veteran's proper payment. The rate tables, in accordance with the system's design, decrease at six-month intervals.

This application authorizes about 1.4 million unreviewed checks for more than $225 million annually. Two types of input documents initiate the payments.

The first type initiates payments to veterans who did not previously receive funds under this benefit program. The second type of document, called a supplemental code sheet, is for the veteran who has already received benefits and is reentering the program, receiving a supplemental award or making a change in key data, such as the number of his dependents.

The data entered on the supplemental code sheet that causes the program to build the scheduled rate reduction is code "77" in a data element called "Change Reason." When VA internal auditors examined 121 supplemental code sheets from 10 different VA locations, however, they found 22 did not contain the "77" code.

Nevertheless, the system had accepted and processed every one of those 121 supplemental code sheets because the software did not contain an edit check to reject documents with incomplete data.

In such cases, the computer used a single rate during the entire training period. The rate was the highest step indicated.

Why did this happen? The GAO said the overpayments caused by processing incomplete documents may have been the result of incompletely trained personnel – and fatigue: "The designer overlooked the edit check, a software problem, in preparing the detailed and complex software."

Unchecked Government Output Cost Millions: GAO

(Continued from Page 1)

"The distinguishing characteristic of these applications, as compared to other computer application programs, is that many of the computers' actions take place without manual review and evaluation," the GAO said.

The use of such systems is enormous in the government, GAO said, adding that at a minimum "government computers issue annually:

- "Unreviewed authorizations for payments or checks (excluding payroll) totaling $26 billion.
- "Unreviewed bills totaling $10 billion.
- "Unreviewed requisitions, shipping orders, repair schedules and disposal orders for material valued at $8 billion."

While there are no governmentwide statistics on such systems, the GAO found 128 operating in just 15 agencies. Out of those, the impact of errors could be as high as $1.7 billion, even though the GAO admitted this would be only a part of the governmentwide total of such applications.

The computer systems in question produce bad decisions "if programmers and analysts make misjudgments or errors in establishing the decisionmaking criteria or if the application is not designed and/or coded in a manner that properly implements the decisionmaking criteria," the GAO said.

There are several reasons the software in such systems can lead to incorrect actions, the GAO report said.

First, the software is often designed with incomplete or erroneous decisionmaking criteria. "Actions have been incorrect," GAO said, "because the decisionmaking logic omitted factors which should have been included.

"In other cases, decisionmaking criteria included in the software were inappropriate, either at the time of design or later, because of changed circumstance."

Another reason for software problems found by the study was the failure to program the software in the manner intended by the user, resulting in logic errors which are often referred to as programming errors.

Finally, programs too often omit "needed edit checks for determining completeness of input data. Critical data elements have been left blank on many input documents and, because no checks were included, the applications processed the transaction with incomplete data."

Data Quality Poor

Besides the problems with the software, "input data quality is frequently a problem," the GAO report found.

"Since much of this data is an integral part of the decisionmaking process, its poor quality can adversely affect the computer-directed actions," the agency added.

Incomplete data is the main problem in this area. "Some input documents prepared by people omitted entries in data elements which were critical to the application, but which were processed anyway," the GAO said.

In other cases, the files in the DP system were not complete or up to date, the GAO said, and the programs were processed anyway.

Incorrect data is sometimes used in automated decisionmaking application processing, GAO added. "People have often unintentionally introduced data into the DP system," and that incorrect data then affected the decisions since no manual review of the output was made.

Finally, "obsolete data used in automated decisionmaking application processing" is often a problem, the GAO found, because updated or new data is not entered into the system when it should be.

DP Protection Topic of Seminar

CHICAGO – Robert H. Courtney, IBM's director of data security and privacy, will head the list of speakers at the Computer/Protection/Insurance Seminar at the Drake Hotel here June 17-18.

The program is cosponsored by *Computerworld* and *Business Insurance* magazine.

Courtney's opening remarks will deal specifically with facilities planning and what top management must know to minimize various risks, according to Edward J. Bride, CW vice-president for editorial services and program cochairman.

Fifteen speakers will address the various aspects of proper planning for computer protection and insurance programs, from the initial stages of site and equipment selection through backup systems and risk analysis.

During a special evening session on June 17, attorney Roy N. Freed will brief attendees on how a properly negotiated contract can be an effective means of obtaining relief from a problem with a computer equipment supplier.

The registration fee is $275 for the first attendee from a company or organization and $250 for the second and succeeding registrants, if the forms are received by June 7. After that date and on-site, the rates increase to $325 and $300.

Information and registration forms are available from Crain Communications, publishers of *Business Insurance*, at 740 Rush St., Chicago, Ill. 60611.

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Hinchman Calls AT&T Lobby 'Distorted'

(Continued from Page 1)

under the Communications Act of 1934, as some critics have charged, Hinchman said.

"We certainly don't read the act as having provided any monopoly for all telecommunications services to the carriers. All we have said is that certain markets [specialized carriers and interconnection] don't exhibit the characteristics of a monopoly," he explained.

The longer it takes for the legislation to come up for a hearing, the more "real facts will come out. We have an economic inquiry which we expect will produce results by July, and there are other studies going on in state commissions.

"As the evidence comes out, the more questionable it is going to be whether these services are actually subsidizing basic phone services or the other way around. That is the issue on which this legislation is premised – that this big subsidy will be lost," Hinchman said.

The more facts that come out on this issue, the greater their impact will be, he indicated.

The AT&T lobbying effort is a direct appeal to Congress and the Bell stockholders to get them to express their views, but the general using public has thus far not been concerned with the intent of the proposed legislation, Hinchman said.

Even though some sectors of the telephone industry do not agree with all aspects of the Consumer Communications Reform Act, they have formed a united front to support the legislation, he said.

In the same way, users may not all have similar views about the impact of the bill, but they should sort out some of those differences so they can present a user position to Congress, he suggested.

Turning to issues coming up before the Common Carrier Bureau, Hinchman said the Computer Inquiry will be reopened within the next month.

"We intend this to be a fairly focused inquiry and not like the broad-ranging original inquiry. There were a few areas that were not clear enough; some of these involve changes in technology since then.

"It will be a fairly limited inquiry into a few discrete issues. We may never be able to define precisely the dividing line between communications and data processing, but we hope we can do a sharper job and have fewer exceptions on each side of the barrier," he said.

CW Photo by R. Frank

Walter Hinchman

It may still be necessary, even after the second inquiry, to deal with some issues on a case-by-case basis, he added.

Turning to antitrust matters, Hinchman said the 1956 consent degree between AT&T and the Justice Department may well allow Western Electric, Bell's manufacturing arm, to offer its products on a competitive basis.

"Bell may just have preferred not to offer products through Western Electric, relying instead on the Bell operating companies on a tariff basis. Anything that a subsidiary of Western such as Teletype Corp. can do, Western should also be able to do," he said.

Asked about reports that AT&T really wants Western Electric to become an independent supplier, Hinchman said the Bell System believes deeply it has to have a total integrated operation with manufacturing a part of it.

But the result of the current antitrust suit against AT&T by the Justice Department could well be a divestiture of Western Electric, as the government has asked in the courts, he observed.

Bombs Rock Maine Utility, But DP Center Intact

(Continued from Page 1)

provisions to use other compatible hardware in the area, Pelletier said.

The dual blasts apparently were set by an extremist group calling itself the "Fred Hampton Unit of the Peoples Forces," according to a letter left in the offices of the *Kennebec Journal*, the local daily newspaper.

Despite the force of the two explosions, which were triggered moments apart, no one was injured. "It's damn lucky we're not burying someone today," a CMP employee said afterward.

The bombs caused extensive damage to a maintenance room on the first floor of the CMP headquarters building and an engineering/office section on the third floor. The DP installation is located on the second floor, between the two blast areas.

Asked if those who planted the bombs could have been attempting to destroy the DP center, FBI special agent in charge Richard Bates said it was too early to determine. But, he added, such a sophisticated motive might be giving the extremist group more credit than it deserved.

The CMP computer center definitely suffered "shock damage," according to Pelletier, but hours after the blasts the equipment was checked out and appeared to be in working condition.

The center has four Honeywell mainframes - two H400s, one H200 and a newer 6040, Pelletier said. If the bombs had exploded nearer to the second-floor DP center, they could have crippled the facility, according to CMP president Elwin Thurlow.

The letter delivered to the *Kennebec Journal* said "We the Peoples Force's (sic) claim full responsibility for the booming (sic) of the main office's (sic) of the Central Maine Power Co. in opposition to CMP's exploitation of the people of Maine and thier (sic) attempt to exhort 20 million dollars from the people by way of rate increase's (sic)."

The letter referred to CMP applications for a rate increase and demanded the company withdraw its application. Hearings on the proposed increase were being held at the nearby Civic Center when the blasts occurred in mid-afternoon.

The letter from the Fred Hampton Unit also demanded that CMP stop further expansion of "nucclear (sic) power in the state" and that the company devote "an equal amount of research itto (sic) solar energy, hydroelectric, and other energy sources."

Asked about the potential seriousness of the demands made in the letter, Bates said, "You have to take this kind of thing seriously when lives are affected."

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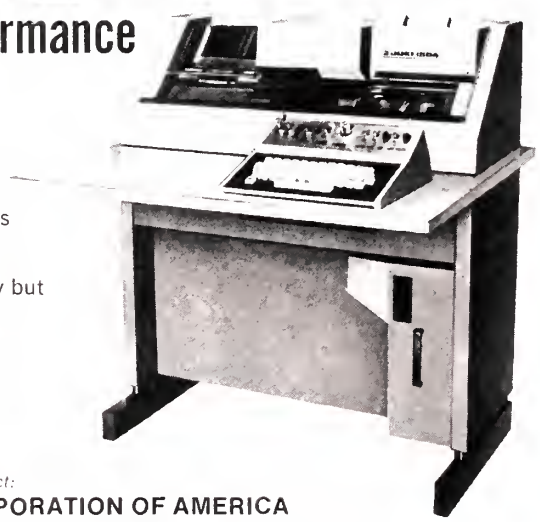

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Intracompany Memos Cited as Pitfall in Contract Suits

By Nancy French
Of the CW Staff

SAN FRANCISCO – The road to contract litigation against a DP vendor is riddled with legal pitfalls that should be avoided to assure success.

That advice came from three members of the Computer Law Association at the organization's West Coast conference here recently.

Users should "stop writing [intracompany] memos about the contract" because such documents become available to the vendor's attorneys during the discovery phase of the case, George T. Caplan, an attorney with Irell and Manella of Los Angeles warned.

If a memo must be written to build the record, it should be addressed to the user's counsel so it stands a chance of being considered "privileged communication." Privileged communication would not be subject to discovery by the other side, he said.

In one case cited by the legal panel, minutes of a committee meeting were routinely typed up and distributed to those who attended. Unfortunately, the minutes contained details of the company's trial strategy, and with routine discovery the documents found their way into the opponent's hands, seriously damaging the user's case.

A second reason for writing as few memos as possible about the contract dispute is that while such memoranda are intended to preserve the record, they instead "tend to highlight issues that could be damaging to your case," Richard L. Bernacchi, also of Irell and Manella, said.

Give Attorney All Facts

The user should make sure his attorney knows all the facts, Bernacchi said.

To do so, the attorney should have access to people at all levels of the company – top management, middle management and people at the technical level as well. The role a person plays in his company's management determines his perceptions of the problem.

Listening to all these viewpoints assures that the attorney gets an objective view, Bernacchi said.

The difficulty in getting an objective picture is compounded by the fact that "there are no standard definitions in the computer industry." Often one person's understanding of a concept is different from that of another person in the same company.

Attorneys should "probe for precise meanings" to assure they know each person's understanding of the terms being used, panel members said.

"After all, how are you going to get a jury to understand what top-down structured programming is if everyone in the company doesn't?" Bernacchi asked.

Users who have hired an attorney to represent them may also do well to hire an expert to help clarify things further and verify their own conclusions, Caplan said.

The expert should be employed by the attorney, however, so his work will be protected by the "attorney work product" principle, Caplan warned. Otherwise, his work could be subject to discovery.

When all the information has been gathered, the case must be evaluated and a decision made whether to settle or litigate, Bernacchi said.

Even with the strongest of cases, litigation causes a lot of disruption in an operation over a relatively long period of time, he added. Many of the user's staff will have to go to court to give depositions and testify, so the firm must decide whether the monetary rewards are worth the effort.

The lawyers could make "a couple of hundred thousand" in legal fees, and the suing firm might not gain anything, he noted.

Sales Log Good Source

In discovery of the firm to be sued, the user's attorney should not overlook the salesman or his logs as an excellent source of information about the case. The salesman may have written some very damaging things about the system he sold, according to John Chapman, house counsel staff member for California Computer Corp.

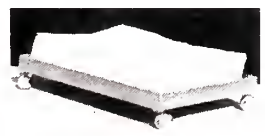
The manufacturer's equipment manual is also a source that should not be ignored. The manual would indicate, for example, the number of terminals a system could accommodate.

While the user should have looked at the manual before ordering the system, the manual might show the manufacturer knew the system wouldn't do the job, panel members agreed.

Third, memos written between technical people often contain a lot of admissions the lawyer can't understand, and this is where the expert comes in, they said.

Finally, before any employee who could be important to the case is fired, the user should be sure to notify the attorney, Chapman urged. One disgruntled employee could ruin a user's entire case, he explained.

In addition, the user should plan to appear in court every day, especially in a jury trial, to assure the jury can identify with him in the case – "see how badly he's been treated by the manufacturer," Chapman said.



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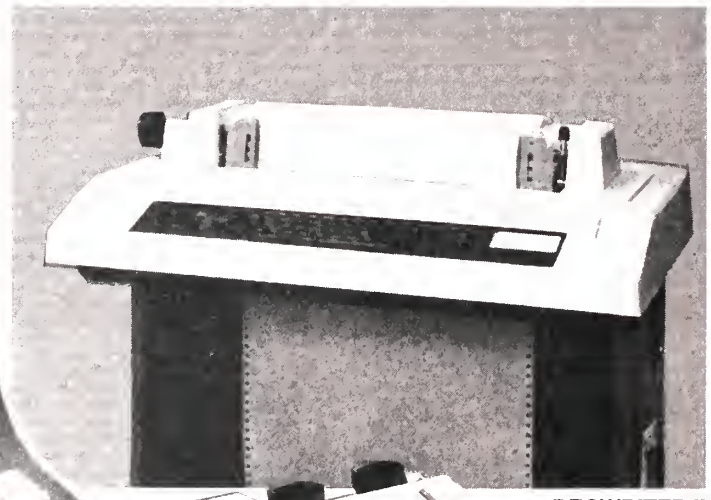

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Calendar

May 20-21, Manchester, N.H. – **The New England NCR Computer Users Groups Spring Meeting.** Contact: Stephen L. Priest, Brockton Hospital, 680 Centre St., Brockton, Mass. 02402.

May 27, Virginia Beach, Va. – **Second Annual Information Processing Exhibition**, sponsored by the Data Processing Management Society. Contact: C. William Smith Jr., Information Systems Administrator, P.O. Box 6191, Virginia Beach, Va. 23456.

May 28, Atlanta – **First Southeastern Region Mumps Users' Group Meeting.** Contact: Mumps User Group, 700 S. Euclid Ave., St. Louis, Mo. 63110.

June 1, Chicago – **Executive Seminar on the Impact of Privacy Legislation**, sponsored by the Data Processing Management Association (DPMA). Contact: DPMA Privacy Seminar, 505 Busse Highway, Park Ridge, Ill. 60068.

June 7-9, Toronto – **American Society for Quality Control (ASQC) 30th Annual Technical Conference.** Contact: ASQC, Department PI-49, 161 W. Wisconsin Ave., Milwaukee, Wis. 53203.

June 7-10, New York – **National Computer Conference**, sponsored by the American Federation of Information Processing Societies, Inc. (Afips). Contact: Afips, 210 Summit Ave., Montvale, N.J. 07645.

June 7-11, Rochester, N.Y. – **Digital and Optical Image Processing**, sponsored by the Institute of Optics and Department of Electrical Engineering at Rochester University. Contact: The Institute of Optics, University of Rochester, Rochester, N.Y. 14627.

June 8-11, London – **Infofair 76**, an information retrieval exhibition. Contact: F.M. Blake, Brintex Exhibitions Ltd., 178-202 Great Portland St., London W1N 6HN, England.

June 17, Gaithersburg, Md. – **Computer Technology: Directions and Challenges**, sponsored by the Association for Computing Machinery and National Bureau of Standards. Contact: Dr. Robert S. Butler, National Bureau of Standards, A247 Technology Building, Washington, D.C. 20234.

June 21-23, Pittsburgh – **The Sixth Annual International Conference on Fault-Tolerant Computing**, sponsored by the IEEE Computer Society. Contact: Steve Clark, Computer Science Department, Carnegie-Mellon University, Pittsburgh, Pa. 15213.

June 21-25, Denver – **Government Management Information Sciences (GMIS) Annual Conference.** Contact: Joseph M. Lewis, Data Services Division, City and County of Denver, 627 S. Broadway, Denver, Colo. 80209.

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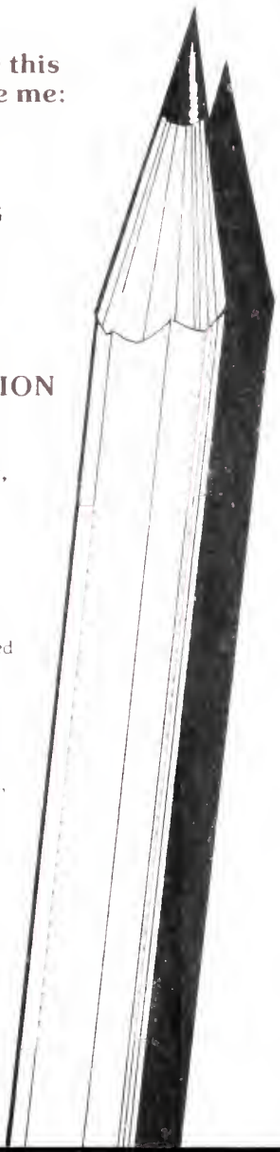

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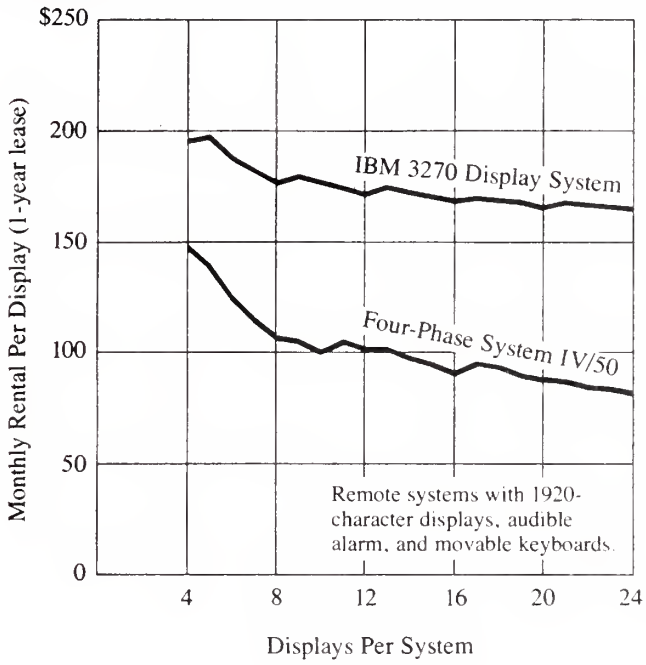

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Minn. Governor OKs Privacy Law's Second Amendment

By Nancy French
Of the CW Staff

ST. PAUL, Minn. – For the second year in a row, Minnesota Gov. Wendell R. Anderson has signed into law an amendment to this state's privacy statute.

The latest amendment:

- Makes criminal justice information "public" as long as the individual is still "within the criminal justice system."
- Confers authority on the Minnesota Legislature to classify all information systems as "private," "public" or "confidential."
- Discontinues the annual report on information systems previously required of all agencies and political subdivisions for review by the Commissioner of Administration.

The amendment, which is becoming law in stages, will be law in toto on June 1. It applies to both automated and manual personal information systems operated by state agencies and political subdivisions within the state.

Under the amendment, arrest information is neither confidential nor private as long as it is "reasonably contemporaneous" with an arrest or incarceration. Thus it is available to the public and the news media.

The term "reasonably contemporaneous" was borrowed from the Law Enforcement Assistance Administration's new guidelines and has been defined as meaning "while the individual is within the criminal justice system," whether he is awaiating trial, in jail or on parole, according to Daniel Magraw, assistant commissioner for administration.

During the time the individual is still in the system, such information would be available through the courts, Magraw said. After the individual has served his sentence and is no longer in the system, those records become confidential and will not be made available to the public in general or employers by the police or the courts, he said.

"In Minnesota, arrest records have not been released to the public for six or seven years," Magraw said, "although in the past it was possible to obtain such information from the local police."

The amendment also established the Legislature as the only body authorized to classify information. All records will be classified by statute by 1977, Magraw said.

Until then, however, the amendment permits state agencies, political subdivisions or statewide systems to apply to the Commissioner of Administration for permission to classify data or types of data for their own use until specific statutes can be enacted.

Before applying for such an emergency classification, however, the law requires an organization to assure no statute exists which allows or forbids classification.

It also requires that organizations show the data on individuals has been treated as either private or confidential by custom of long standing recognized by other state agencies or political subdivisions and the public.

Such an application must also show a compelling need for immediate classification which, if not granted, could adversely affect the public interest or the health, safety, well-being or reputation of the data subject. All such applications are subject to approval by the state Attorney General.

All emergency classifications that have not been formalized by the Legislature by June 30, 1977 will expire that day; no further emergency classifications will be granted beyond that time.

Annual Reports Eliminated

Finally, the amendment eliminated the existing privacy law's provision requiring the state's 1,850 agencies and political subdivisions to file an annual report on their public information systems with the Commissioner of Administration, effective Aug. 1, 1977.

Agencies and political jurisdictions will continue to be required to update their reports, however, and make the documents available to the public within the agency or local community.

The law was passed in the spring of 1974 [CW, May 8, 1974].

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Calif. Legislator Defends Privacy Bill On Grounds of Limitations, Low Costs

By a CW Staff Writer

SAN FRANCISCO – The proposed California privacy law which covers the private as well as the public sector would create no bureaucratic hierarchies to administer it and would make nothing illegal as long as the public is informed, the assemblyman who introduced the bill said here recently.

The bill, introduced by Assemblyman Mike Cullen (D-Long Beach), was approved by the California Assembly [CW, Feb. 16] and has been referred to the Senate Policy Committee for study and possible further amendment.

The bill will be brought up for vote in the Senate during the last month of the session, Cullen said.

Simple, Low-Cost Bill

Comparing his simple, low-cost bill with the one that passed both houses of the Legislature last year only to be vetoed by Gov. Jerry Brown, Cullen said Brown didn't veto last year's bill because he didn't understand it – "he vetoed it because he did understand its onerous provisions and high costs."

People are searching for ways to protect their right of privacy, and it is the intrusion of computer technology they are most concerned about, he told members of the Computer Law Association.

"In the computer age, privacy, like the bald eagle and the blue whale, was becoming an endangered species," he said.

As evidence, he noted the California constitution was amended to make privacy a constitutional right in this state as long ago as 1972.

Only automated personal information systems are covered under the provisions of Assembly Bill 150, and only in a broad conceptual manner, leaving responsibility for a detailed interpretation up to the courts, Cullen said.

Secondly, he said, the bill is aimed at "informing the people about what is going on – how their records are being used," he said.

Third, "it is the first in the nation to cover both the public and the private sector," he said.

The bill contains a code of fair information practices that allows anyone to establish, change or terminate an automated personal information system as long as he files a public notice indicating its purposes, uses, data categories and routine recipients.

The bill also requires the recordkeeper, when collecting information, to tell the data subject how it will be used and the consequences he may face if he refuses to supply the data, Cullen said.

The data subject may obtain a copy of his record from any organization for a fee of $5 "to discourage" a group from requesting the record of every member, for example, he explained.

In the case of a dispute between the data subject and the recordkeeper, each may file a statement of not more than 100 words that must be kept with the record, he added.

Any personal information may be disclosed upon consent of the data subject and information which is not personally identifiable may be disseminated for statistical research.

State archives, law enforcement officials and state and local government agencies with statutory rights to personal records may obtain them, he said.

The bill would make nothing confidential that is not already confidential, he said, and law enforcement records have been excluded.

Cullen said he has been encouraged by corporate response to the bill. The General Electric Co.'s privacy task force has been studying the bill and said it would cost that company $64,000 to comply – far less than any earlier bills, he said.

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Study Sees Computerized Nations More Vulnerable to War Threats

By Catherine Arnst
Of the CW Staff

STOCKHOLM, Sweden – The wars of the latter half of the 20th Century have tended to break out in underdeveloped, "third-world" nations where automation is still a stranger.

But those nations advanced enough to be submerged in computerization could be even more vulnerable to the threat of war, a study recently released by the Swedish Ministry of Defense contended.

"Computerization presents new and efficient methods for creating chaos and confusion in the community with very little effort," according to the study of Sweden's dependence on computers, titled "The Vulnerable Computer Society."

The Secretariat for National Security and Long-Range Defense Planning, which prepared the study, said the result of increased dependence on DP will be that "many of the peacetime functions in total defense will be so dependent on computers that it will take vast emergency planning and expenditure to ensure defense can fall back on manual routines in the event of war."

It also warned that the interaction between and interdependence of computer systems could mean that "a completely trivial event, such as the failure of one data system, may have far-reaching consequences for large sections of the community."

Although such events can occur in peacetime and still cause considerable problems, "it seems even more reasonable to assume that such events are more likely to take place during periods of what can be loosely termed 'social stress,' " the report said.

'Irreversible Process'

The problem with automating a large number of processes in a society is that "the introduction of computers would seem to be an irreversible process, i.e., it is impossible to return to former production techniques . . . once processes have been computerized.

"Of course, this considerably increases the sensitivity and vulnerability of society to different kinds of upsets," the report said.

The computerization of certain functions would particularly lead to a pronounced heightening of vulnerability, the report said.

These functions include activities previously dominated by labor-intensive techniques requiring the handling of large quantities of data, such as bookkeeping, advanced surveillance and control of complicated courses of events, such as traffic surveillance and control.

The computerized control of production processes in the manufacturing industry and real-time processing, which has made it possible for several users to be in direct contact with the computer via remote terminals, were also cited by the report.

Ideal Targets

Data banks which contain detailed information on a country's population are ideal targets for "a possible aggressor who is trying to gain effective and complete control of the population when engaged in acts of war," the study warned.

Data communications between nations are also extremely vulnerable; facilities for an effective control of the information moving between countries are very limited, it continued.

"International movements of data should be kept under very vigilant surveillance," it urged.

The greatest danger to a computerized society in time of war is its computers, the report emphasized. Not only is it difficult to operate a society dependent on computerization during war, but "it is possible for an aggressor to choose targets so that by spot strikes on DP systems he can achieve both great psychological effects on the entire population and the total disruption of local production and community services.

"Expanding computerization will probably require new and much more comprehensive security measures in order to safeguard the administration of society in the broadest sense of the term," the study recommended.

Survey Finds Businesses Mixed on Hiring Grads Of Vocational School

By a CW Staff Writer

WARWICK, R.I. – High school seniors studying DP at the Warwick Area Vocational Technical Facility here conducted a survey of area businesses that resulted in a mixed bag of responses on hiring students trained in this manner.

The survey, answered by 112 DP centers, asked employers what they are looking for in the way of training, their assessment of the Warwick program and whether they would hire a student from that program.

The school sponsors a cooperative work program with area businesses, of which 40.17% of the responding companies were familiar.

Only 27.59% of the companies, however, were willing to participate in the program, the survey found.

But 62.50% of the companies did feel a graduate of the vocational school had sufficient knowledge to be considered for a job in the computer area; only 4.46% answered unequivocably "no" to that question.

The level at which these graduates would be hired ranked low in the job hierarchy, however – 70 companies said they would consider hiring the student as either a computer operator trainee or at the keypunch operator level, 47 as a verifier operator and 39 as a programmer trainee.

Biggest Gap

Hands-on experience was most often given as the area in which high school graduates are lacking.

About 53% of the respondents felt the students would have insufficient background in accounting and bookkeeping, 22.3% thought reading comprehension was poor and 25.9% thought students needed more business math and basic arithmetic functions knowledge.

The area of training given the highest priority by employers was documentation procedures, which 52.7% of those responding cited as an area in which they would like to see students trained.

This has prompted the school to change its curriculum to include heavy emphasis on documentation, which Jim Osbaldeston, a computer technology instructor there, said was an area both the survey and his experience indicated was covered too lightly.

One conclusion Osbaldeston reached was there is a feeling in the DP field that the school's program, which is similar to that of Rhode Island Junior College, is "geared too high for high schools students.

"That's not true; we try to give the kids as much as they can handle," he said.

Osbaldeston was not overly disturbed that so many employers were reluctant to hire a student in the program because he considers it a "model program" designed to provide its participants with the basic skills and knowledge necessary for entry into more comprehensive programs at the postsecondary level.

About 90% of the students graduating from the program go on to college, usually majoring in computer science, accounting or business management, he said.

"Employers are reluctant to hire someone straight out of high school," he said, "but I've been successful in placing all students who do want a job. They are usually hired at the trainee or junior level."

Since the survey was concluded, the school has also received more inquiries about its cooperative program, which allows students to gain the experience desired by many employers.

"The problem I've found with employers is not that they're not willing to participate, but that they don't have any slots open. It's rare they say no," Osbaldeston said.

Osbaldeston does not think high school is too early to begin training a student for a career in DP.

"This is the direction where education is going now," he said. "Many more students want to learn a skill at the high school level."

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Editorials

Backing Bell Blindly

It seems to be quite the spring fashion for members of Congress to join up as cosponsors of the AT&T-fostered Consumer Communications Reform Act. At present, more than 60 representatives and about nine senators have joined in endorsing this proposed legislation [CW, March 22].

Some of the legislators have justified their backing of the bill by claiming they welcome an open debate of the issues being raised by the Bell System and its allied telephone companies.

But do these members of Congress understand that this bill – which purports to help the consumer – will actually eliminate two emerging fledgling industries which are struggling to survive in an environment where the established carriers and equipment suppliers reign supreme?

Do they understand that this bill would virtually eliminate federal control over our common carrier telephone network by relegating that control to separate state agencies, each of which would set its own charges for services and its own standards for network operation?

Do they understand that separate state rules and regulations might make it impossible for the nation's businesses to operate their vital coast-to-coast intracorporate communications networks?

Do they understand that the carefully controlled competitive environment fostered by the Federal Communications Commission in the narrowly defined specialized carrier and interconnection areas would no longer experience innovation because it would no longer exist?

Those politicians who choose to put their names and support behind this bill should realize they are helping to block competition, to make phone rates even higher and to create a carrier environment that will stifle the introduction of new services and products businessmen want and need.

A Joint Responsibility

Some groups have an image of DPers as people who are more interested in the machines with which they work than in the people served by the systems.

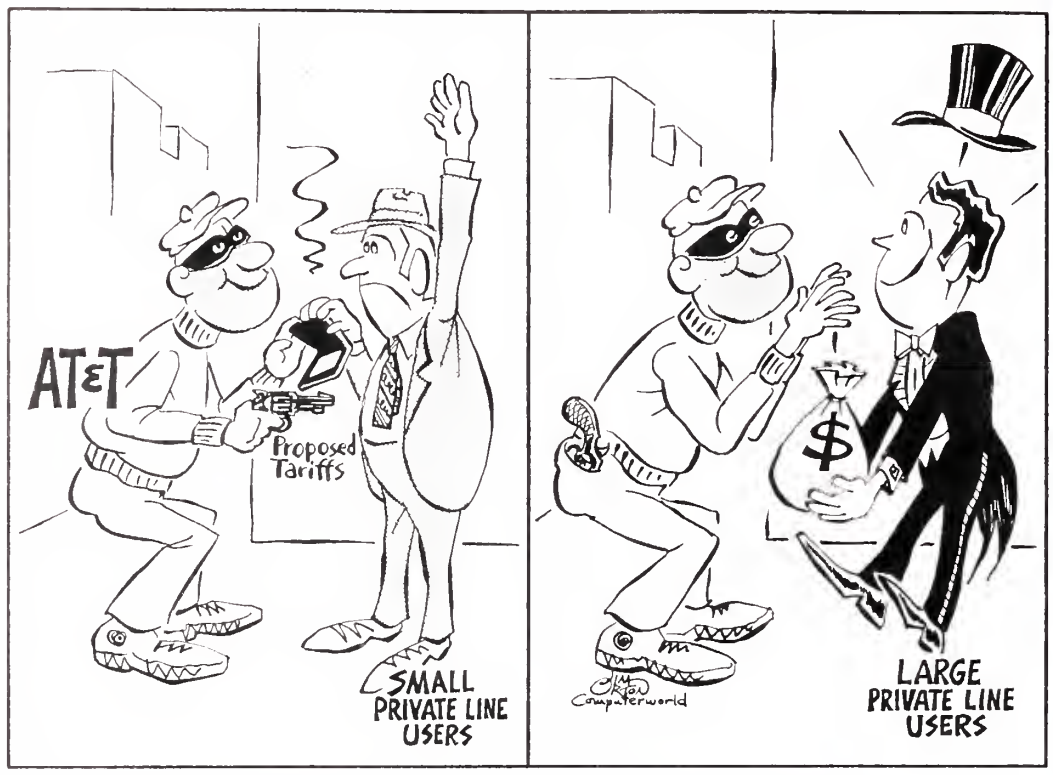
That image is exaggerated, but it is often believed. A case in point is the recent Human Services Information Systems Conference, where a number of attendees complained that those involved with the operational end of systems – such as DPers – tend to ignore the people served by the systems in favor of more efficient systems design.

The goals of efficiency and error-free systems design are important, but in this and in many other areas, those goals often have to take a back seat to the needs of the people affected by the system.

Both DPers and social workers have a responsibility to bridge the gap that is too often apparent in the social services field. The social workers should make it part of their job to understand how automation can help their clients and to translate their clients' needs into language that can be understood by the computer experts.

And the computer experts must spend more time learning about the real needs of people served by the information systems in this area. They should strive to design systems that meet those needs rather than systems that just operate more efficiently.

Perhaps, with such cooperation, the nation may see the beginnings of a welfare system that will not trap its beneficiaries, but help to free them.



Robbing Hood

Letters to the Editor

Grosch Missed the Point

Herb Grosch missed the point of the new triservice programming language DOD-1 [CW, May 3].

Far from being a 10th entry in a field of nine, DOD-1 is a comprehensive and modern language which will have enough control clout behind it to eventually oust most of the pretenders to the universal language crown.

Grosch should have read the requirements spec (called "Tinman") and then made a judgment about DOD and deja vu.

Robert L. Glass
Seattle, Wash.

Take Hard Sell to the Masses

My ignorance may be showing, but I think the DP industry is in its own vacuum when it considers the apparent failure of the Universal Product Code (UPC).

It has been a long time since American industry has consulted the consumers, as the April 19 editorial cartoon indicated. If you were to ask Proctor and Gamble what sold so much Tide over the years, the rapid response would be to throw a copy of *Fortune Magazine* detailing a superbly tuned marketing plan at you.

UPC people need to educate, indoctrinate and otherwise impress consumers with their new toy.

Bring on the billboards, personal testimonies from stars, talk show exposure, magazine ads (*Home and Garden*, not *Datamation*) and last but not least – a Country Western singer that can do for UPC what C.W. McCall did for CB radio!

Generally speaking, few will buy a "pig-in-a-poke," but if Johnny Carson interviewed an industry spokesman about the expenses of price marking and inventory records, some segment of the populace might look forward to seeing those stripes.

Please, someone preserve the technology so I can put it in my warehouse to check orders some day!

Ray Kaplan
Tucson, Ariz.

Ads Show DP's Anti-Women Bias

In the April 26 issue of *Computerworld*, we were again reminded of the blatant and subtle discrimination practices of the computer industry.

The following advertisements ignored the fact that 20% of the professionals in the computer field are women:

- The ad for Prime Computer, Inc. on Pages 22-23
- The ad for Northrop Data Systems on Page 47.
- A second ad for Prime on Page 41, a miniature of Pages 22-23.

It is this kind of insidious, hidden pursuasion that keeps women and other minorities from equal pay and advancement in this field.

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Acting Head
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'Peopleware' Term Offensive

I wish *Computerworld* would consult its consulting editor, Herb Grosch, and ask him what he thinks of the term "Peopleware."

On my part, every week I read CW I find the term and its implications increasingly offensive.

Gerald M. Weinberg
Lincoln, Neb.

We sympathize with reader Weinberg and welcome suggestions for a more "humane" marker for the articles we run attempting to show that selection, training, motivation and support of people is at least as important as selection, optimization and use of hardware and software if the total DP operation is to be effective and efficient. Ed.

(Other letters on Page 14.)

Data Past

Five Years Ago
May 19, 1971

PARK RIDGE, Ill. – The Certification Council of the Data Processing Management Association abolished academic requirements for the Certificate in Data Processing (CDP) at the council's spring meeting, but increased work experience requirements from three to five years. The council said the cause was significant changes in society – particularly in the educational segment of college curricula, practices and the nature of the degree itself. The changes took effect at the 10th annual CDP exam in 1972.

SANTA CLARA, Calif. – Computer Synectics, Inc. (CSI) here claimed IBM had illegally changed policies by offering free use of its Systems Measurement Instrument (SMI) and filed a $15 million antitrust suit against IBM to force a return to the price tag. Dudley Werner, CSI president, helped design the SMI computer performance measurement tool before forming his own company in 1969.

Repairing the Damage

It certainly was not my intention to write a whole series of pieces about privacy. The news column of CW and the general and business press are quite full of it, and I ought to be off browsing in other pastures. But the recent Supreme Court action regarding bank records is so important, not just for data processors and do-gooders, but for the man in the street, that I have to return to the issues.

Recently I asked, "Who owns the data?" and predicted that, while banks and credit bureaus and hospitals and school registrars claimed they did, in the long run it would be recognized that every individual owns his own personal data and permits use of that data only for his own advantage, or in a closely limited number of ways, as legally required (taxes, for instance). Well, I hope I'm right – but the day of recognition sure took a mighty hop into future time when the Nixon Supreme Court ruled that bank statements, telephone bills, and the like are not private at all, do not require a subpoena for examination by Uncle Sam's agents, or just about anyone else who is snooping around.

Ugly! And dangerous, not only for civil liberties but for ordinary commercial confidentiality: if an IRS man, why not a cop; if a cop, why not a private investigator – or a crooked or venal minor official. But, although I'm of course not a lawyer and can't read the decision professionally, I suspect the court is correct: there is no constitutional right or legal precedent or even established custom to protect our financial data – or us.

Three levels of remedy are possible. The first, the one we all need desperately, is terribly hard to arrive at and cannot come quickly. That is, new constitutional law, state or federal, which specifically confronts modern and ancient challenges to privacy; a first line of defense against arrogance and greed and Big Brotherism. Sam Ervin has seen the lack, and as the senior constitutional law expert in the Senate, pointed it out back in the Sixties. But as I said, that kind of protection is slow. From the first calls for amendment to enactment and installation would be five years in a Wisconsin or a Minnesota, ten years in a California, or nationwide.

To tide us over until a Great Wall of fundamental law can be built, we need narrower legislation and executive orders. The Congress, legislators in "good" states, and even governors and heads of Federal agencies and departments can protect certain classes of data, certain files and documents, from specific incursions and abuses. If the bank guys in Washington can define the term "branch bank" with one stroke of the ballpoint, and overturn EFTS plans like a bulldozed antheap, why cannot the same people put out regulations that, for a few years at least, will protect my photophobic dollars? And clearly Congress can pass laws far short of Bill of Rights stature, negating much of the Supreme Court thrust. After all, what was claimed was that *existing* law did not reserve financial records from inspection; new law is certainly possible.

I remember also with considerable pleasure that Gov. Sargent of Massachusetts, while I was serving on his *ad hoc* privacy commission, signed an executive order forbidding state employees to disclose or abuse broad classes of personal records. Such abuse did not thereby become illegal; statutory action was to come later. But an employee could be reprimanded, demoted or fired for disobedience: that's a powerful discourager.

Finally, in areas where neither constitutional nor specific laws are erected, there is a real possibility of voluntary (i.e., profit-motivated) protection. I bank with a major California giant, and lesser chains and local banks hanker for new accounts. Let one of the latter offer me *voluntcered* privacy -- no incursions without subpoena – in such a way that I can sue for breach of contract, and heavy punitive damages, without detailed demonstration of loss. I'll transfer in a minute, and so would lots of others. I honestly believe that voluntary protection offered by commercial outfits, and executive orders in school systems and motor vehicle bureaus and assessors' offices, could plug most of the gaps opened up by the Court. And then, to avoid having them pried open yet again, constitutional protection!

There are inevitably areas between the completely commercial and the entirely government: hospitals, for instance. That would be where special legislation, my second area of action, would be extremely helpful. Suppose state law were to ensure enforceability of wording on all data entry forms where the signer is subject to civil or governmental penalties for misinformation – wording that specified how the data submitted was to be used, wording which would refer to the underlying law, and potential penalties. Properly drawn, such law would establish intentional disclosure as *prima facie* evidence of breach of contract.

No, we aren't helpless. And of course expert lawyers and legislators could think of more powerful tools, better than the above. What we need is recognition of an enormous new threat to individual liberty; the tools to defend it will be forthcoming.

Herb Grosch

Standard Format Encourages Accurate Documentation

By Richard Zaneski
Special to Computerworld

Today's expanding computer industry requires accurate and well-written documentation. In most cases, the written word is an afterthought, regarded by many as a luxury. However, as software requirements grow, this luxury becomes a necessity.

Little has been done to develop a standard documentation format in-house over the years. As a result, many DP managers have become frustrated with their existing documentation and the reluctance of staff members to write it.

In the past, efforts were made to generate technical documentation by programming and systems personnel. Not being professional writers, they created unorganized material. Then, after being put in operational use, the documentation was not properly maintained. Eventually it became obsolete and useless.

Other groups recognized the problem and brought in professional nontechnical writers to do the job. Some met with limited success. However, most had little or no programming, systems or computer knowledge. The result was wasted time and a written product that was weak.

With these past experiences in mind, many groups turned to technical writers who specialized in data processing and related fields. This handful of professionals were mindful of the problems facing data processing personnel. Their qualifications were unique and appropriate for the job at hand.

Flexibility Needed

At that time and today, these qualifications include flexibility and a receptiveness to an ever-changing work environment. In addition, versatility and a certain creative flair should supplement a good writing ability and a basic technical awareness.

Three critical areas of programming and systems documentation face technical writers in today's DP community. They are: operating documentation on a program and systems level, related user manuals and actual work procedures used by a data center and its affiliated departments. Each area of writing requires a certain expertise in its preparation and explanation.

Operating documentation can be as detailed as a group desires. This requirement must be determined initially when the basic standards are developed by the technical writer and DP staff.

Also, the programming and systems sections of the operating documentation must be restricted to their areas of use. This precaution provides a certain amount of security that is necessary in today's business world.

Essential program areas that require documentation are as follows:

- Program description.
- Input and output file identification.
- Output report identification.
- Run frequency.
- Program logic narrative with an associated flowchart.
- Amount of core.
- Runtime.
- File use.
- Printer type.
- Carriage tape used.
- Unique forms or reports.
- Console messages and any required action.
- Job control language.
- Control card formats.

This information can be expanded or reduced as the needs of a group dictate. It should be noted that as each set of program documentation is developed, a common link must be established.

For example, if individual program write-ups contain common files, they must use the same file names. Also, the file source and destination must be included to maintain a consistent flow between written operational units.

Reader Commentary

System documentation, however, can be broader in its approach. It closely parallels those areas listed for program documentation, providing greater detail and more control data. Its function will be to provide a source of reference for DP personnel.

When preparing both types of operating documentation, they should be typed on a standardized page. It is an excellent vehicle which encourages written consistency and greater flexibility. The typed pages must then be placed in protective plastic and numbered binders. This numbering procedure forces personnel to place a volume in its proper place.

In addition, every volume must have a table of contents and list of effective pages, allowing positive control over all written material.

User manuals constitute another vital area. Their complexity is based on a user's needs. However, they should contain enough information to give a user a sound understanding of a system and his related job.

Areas of information in a manual can include the following

- System overview.
- Input forms and their preparation.
- Output reports and related error messages.
- Pertinent program descriptions (if desired).
- Code listings.
- Glossary of terms (if desired).
- Clerical functions to be performed using the forms or reports (if desired).

Each area of information in a user manual requires an individual chapter. If further divisions are necessary, they should be numbered for ease of referral.

Data Center Functions

The third vital area of documentation details the steps necessary to perform specific functions in a data center and its related departments. These individual work procedures are broad in coverage. They provide a link between personnel and the computer.

Procedural writing requires a different approach. The tone of the narrative must be geared to the individual.

All procedural steps require the imperative tense except when explaining some point. By using this technique, the reader of the procedure knows the information is directed to him.

Since these procedures are unique, isolate them by operational group. Number them and place the master copies in a binder with a table of contents.

Other types of supplementary documentation support these major areas. Even with their individuality, basic rules for writing, consistenty and factual correctness must be remembered.

Zaneski is a technical writer at United Jersey Bank in Hackensack, N.J.

Alan Taylor is on vacation this week.

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Letters to the Editor

2001 Should Be Fun

Marvin Goldstein's letter [CW, May 3] mentioned only one future date that is going to cause problems.

I hope all those problems will be solved before Feb. 28, 2100. At midnight on that date, the calendar will change to April 1, but the standard method of checking for a leap year is to divide the year by 4.

The year 2100 is not a leap year, but a whole potfull of programs will calculate that it is.

Let's stick around and watch the fun.

Monty Goolsby
Savannah, Ga.

Opening the Doors

"Mistakes in Selecting Gear Avoidable" [CW, April 12] described an approach used by "ivory tower experts" who clearly do not know what it's like in the real world.

It is their oft-overpaid-for recommendations that create much of the trouble and mistakes that plague the average end user. Just because there is expertise around in vendors' and users' organizations, it cannot by virtue of its existence prevent someone from making an incorrect selection of equipment or a bad estimate of cost.

It is an implied duty of each conscientious user to keep pace with developments in technology and equipment. There is no problem because there is no single guru of DP information (Herb Grosch excepted); on the contrary, there is opportunity!

Every user should be grateful for competition. If it didn't exist, he would soon be subjected to some strong-arm tyranny – an environment that soon sparks competition.

The article suggested that an open-door policy for salesmen is impractical. Let this letter call attention to the real world and suggest that this is the way it really happens. Nothing happens in this life until someone is sold something – and many articles in *Computerworld* have been dedicated to the testimonies of those who have found both mechanical and system advantages plus dollar savings by opening their doors.

In computing an equipment evaluation, the article suggested the academic approach of defining objectives rather than the problems at hand (what you want rather than what you have and live with daily). If C.G. Weitzmann had read any Dunn & Bradstreet report, he would know they are much more meaningful for large corporations than for small companies – especially new ones.

Reid Clark
Scottsdale, Ariz.

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Remote Translation Puts New Life in Old Programs

Special to Computerworld

MINNEAPOLIS – Honeywell's announcement in late 1973 terminating maintenance on the old H800/1800s after December of 1975 forced General Mills, Inc. (GMI) to reconsider some of its long-range plans.

A massive number of current production runs would have to be moved to other equipment a lot sooner than had been envisaged. The problem posed was not unique – How can a user protect a programming investment in an obsolete language on an obsolete machine?

What was unique was GMI's answer: to have a small software conversion house perform a translation of over 300,000 source language card images into another language, using GMI's computer here in a time-sharing environment, from a terminal located "down east" in Maine.

The story started in 1960, when GMI selected a Honeywell 800 and the English-like Fully Automatic Compiling Technique (Fact) compiler as its hardware/software combination.

In 1966, the company switched to Burroughs and to Cobol for new business applications. Remaining after this switch were over 700 Fact programs running satisfactorily on a Honeywell H1800.

In 1973 the remaining life of these Fact programs was estimated at five years. To maintain schedules calling for future resystemization of these applications, the GMI Planning Group needed a quick method of moving production runs of H1800 Fact programs to a Burroughs B6700 environment at a cost commensurate with their projected life.

It Can Be Done

One small software house, Data Services, Inc. (DSI) of Augusta, Maine, proposed an ell-electric transformation and produced a set of detailed design specifications showing such an approach was feasible.

DSI argued that since the Fact programs were performing satisfactorily, a perfect translation of application intent would result if the logic inherent in the Fact source programs was expressed in standard Cobol.

The outstanding difference between the two languages was input data handling, and that could be reconciled by using Cobol Working Storage.

Fact allowed the programmer to obtain individual data groups, using any one of six different input statements. In their place, Cobol statements were generated to move specified data groups from the File Section into Working Storage, in direct imitation of the Fact input routine.

Output was formatted to facilitate input handling. Data file conversion was also to the same format. All procedural data references were to Cobol Working Storage.

DSI also automated the administrative chores associated with planning and scheduling the move to the Burroughs machine.

The manual labor of transformation scheduling and accounting was minimized: the B6700 computer not only performed the program translation and data conversion, but also scheduled and controlled it.

Tabled Translation

The translation process required the use of numerous tables. The Fact source language programs were read as data by the translation program and parsed into fixed-length numeric fields using a Fact reserved word table.

User data and procedure name tables created in the process were filed for later reference.

Using a syntax table, the input stream was reduced to statement number operators. A functionally endomorphic mapping of Fact statement numbers into Cobol statement numbers was done through a transpose table.

The result was then exploded into Cobol language via Cobol statement and reserved word tables, utilizing the data and procedure name tables previously filed away.

In the intial data reduction, table searching was necessary, but all other tables throughout the process were entered directly by making the unique numeric indicator for each element in any table a value that was a pointer for a subsequent table entry, thereby minimizing translation time.

The tabular data was entered, corrected and stored on disk as data files and the translation programs themselves as modular ANS Cobol source files, using standard Burroughs communications and editing software.

A specially written remote job entry program dynamically prefixed work file titles referenced by the generated job control deck files with job number (for the sake of uniqueness) and then purged them when the translation was done. Multiple translations could therefore be scheduled and run at the same time without interfering with each other.

During the translation software development stage, systems dumps were redirected and reformatted from the printer to a temporary file on disk for terminal access purposes. The Fact input was loaded to disk on request, and the Cobol output was initially on disk.

Thus the entire translation system could be developed, initiated and monitored from a remote terminal 1,500 miles away from the source language library.

GMI's primary concern was the runtime for the translated production programs. After a sufficient volume of runs to establish a trend, B6700 runtime averaged about one-third the comparable run-time on the H1800.

DSI can be reached through P.O. Box 0, Augusta, Maine 04330.

Hardware-Software Line Blurs in Firmware Products

'Micro Basic 1' Uses Intel 8080

CULVER CITY, Calif. – Micro Basic 1, now marketed by Hamilton/Avnet Electronics, is a full Basic language compiler system operating on an Intel 8080 CPU "chip."

It will soon be released on the Motorola 6800 microcomputer as well, according to the developer, Ryan-McFarland Corp.

Micro Basic I was designed to support fast and accurate development and delivery of application programs for micros, a spokesman said.

Everything needed – compiler, text editor, loader, debugger and runtime support – is provided in a single package operating right on the microcomputer itself, he added.

The programmer may use any of several I/O devices to submit his work. Fast integer arithmetic and powerful string-handling features make Micro Basic I "the perfect system" for almost any microcomputer application, Ryan-McFarland claimed.

Compiled programs are supported by two subsystems. The runtime system contains all the arithmetic, string-handling, I/O and control routines required to execute the user's program; the load-and-go system includes the runtime routine and a relocating linking loader.

Both of the subsystems are available now in programmable read-only memory (Prom) from Hamilton/Avnet and will be available in read-only memories (ROM) as well.

By combining the Ryan-McFarland software and the Hamilton/Avnet firmware into a single product, a system can be built that will execute any compiled Basic program, the vendor said.

The total Micro Basic I package is "highly adaptable," according to Ryan-McFarland, and will fit into "any machine environment" as a system component.

It is intended primarily for OEM and system house use, the spokesman added.

Ryan-McFarland is at 608 Silver Spur Road, Rolling Hills Estate, Calif. 90274. Hamilton/Avnet, with outlets across the U.S. and in Canada, is headquartered at 10912 W. Washington Blvd., Culver City, Calif. 90230.

Driver on Nova Works With 'Iris'

IRVINE, Calif. – A firmware-oriented multitasking version of the Interactive Real-Time Information System (Iris-F) from Educational Data Systems (EDS) includes a firmware driver parallel processor to perform "penny-precision" decimal arithmetic on Data General Corp. Nova minicomputers.

An "advanced index random file structure for data base management systems" is also part of the software/firmware system, according to EDS. Iris-F supports multiple languages, and interrupt-handling capabilities allow users to concurrently run real-time tasks in foreground, time-sharing tasks in "middleground" and batch tasks in background.

Tasks can be core-resident for fast response or stored on disk and swapped in and out on demand. "More than 1,000" priority levels are provided, and priorities may be dynamically adjusted to reflect current job stream resource demands.

In Iris, peripherals are treated the same as files. Channel I/O allows either file or peripheral assignment to be made by the operator at runtime, the vendor said.

Iris supports a business-oriented Basic, a conventional Assembler, a Macro Assembler and a Report Writer language in time-sharing mode. "All necessary tools" for writing new processors and integrating them into the Iris environment are also in the system, and users are encouraged to use these tools, EDS said.

Data base management in Iris includes support for text, formatted and contiguous file structures as well as the newly implemented index random files. The new capability permits a common data base to be accessed using any search key for which a directory has been established.

In time-sharing operations, Iris supports "32 or more" users. The system operates on any Nova-type computer with 16K to 32K memory and multiple disk capability, EDS said.

Iris-F is available for $3,600/system, "including 30-day warranty. The Iris subscription service extends the warranty to one year," EDS noted from 17981 Sky Park Circle, Irvine, Calif. 92707.

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'Shorthan' Eases Initial Cobol Coding

TAMPA, Fla. – Described as a "front end" to a source statement library maintenance system and "not a precompiler," Shorthan from C.W. Jackson & Associates, Inc. is said to reduce the Cobol coding effort by supporting the use of abbreviations for commonly-used words or phrases.

Shorthan expands the abbreviations into valid Cobol verbs, syntax or data element names, the vendor said.

Installations may determine their own list of abbreviations, use the "standard" ones provided by Jackson or combine the two sources.

The abbreviations reside on a permanent tape or disk file and are dynamically loaded into an internal core table each time Shorthan is used.

Since the table is under user control, it may be changed as new situations arise. Different application areas, for example, can use different abbreviations – with meanings peculiar to each area – for the same data element, Jackson said.

The use of abbreviations not only reduces programmer time and effort, the vendor said, but also the potential for errors in keypunching and diagnostics in the compilation process itself.

First Letters

The abbreviations used typically are made up of the first letter of each word in the phrase being shortened; LABEL RECORDS ARE STANDARD might therefore be coded as LRAS, Jackson explained.

Shorthan is written in ANS Cobol and can be installed on a "wide range of computers." In an IBM environment, it usually requires a partition or region size of 48K bytes.

The package is available to U.S. and Canadian users for a one-time charge of $500 plus installation costs, Jackson said from 11700 N. 58th St., Tampa, Fla. 33617.

CMG Issues Call For CPE Papers

WASHINGTON, D.C. – The Computer Measurement Group (CMG) has issued a call for papers to be presented at the group's annual meeting in November in Atlanta.

Discussions of performance management and technology, as well as tutorials on basic computer performance evaluation (CPE) concepts, are of interest, according to technical program chairman David Lindsay.

Abstracts (in five copies) should be submitted before June 1 to Lindsay at Fedsim/AY, Washington, D.C. 20330.

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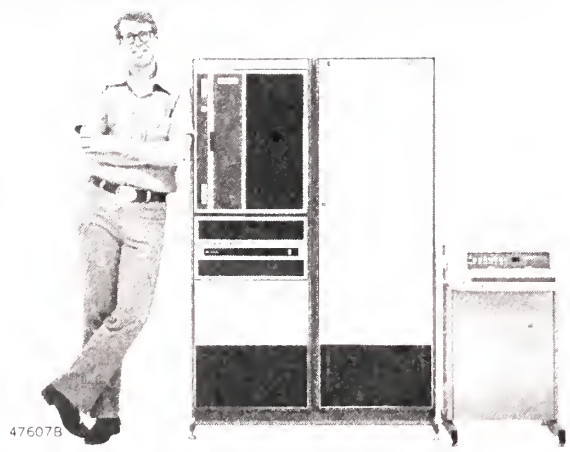

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Codasyl Report Explains Choice of DBMS Ingredients

By Don Leavitt
Of the CW Staff

NEW YORK – The latest report of the Codasyl Systems Committee may bring sighs of relief from those installations seeking detailed help in deciding what capabilities, if any, of a data base management system (DBMS) they need.

In its 235 single-spaced typed pages, *Selection and Acquisition of a Data Base Management System* doesn't mention a single system by name. It leaves that to the earlier reports of the Codasyl Data Base Task Group, to numerous other books and to the vendors' own literature.

But even without naming specific products, the report outlines the general characteristics of DBMS now on the market and points out fundamental differences of which users should be aware -- the difference between "self-contained" and "host language" systems, for example.

Recognizes Two Users

The user's view predominates, but even that isn't completely accurate because this report recognizes there are, in fact, two types of users. And it separates its discussion into sections aimed at non-DP end users and at the technician who needs to know what is happening below the surface of the DBMS.

Codasyl also recognized the report in its entirety could be overwhelming: "The authors anticipate that the reader will read through the entire document, but will find that intensive study of various parts of its contents can be done without complete and total grasp of the report," the preface noted, adding chapters and sections are set up as independent items.

The report's makeup is illustrated by its treatment of "Programs and Processes" in the chapter on "System Selection and Acquisition," which itself appears only after four chapters of preliminaries.

Assuming the installation has a need to integrate its existing programs into the DBMS and most of the programs are written in a particular higher level language, "there will probably be a requirement that the [DBMS] have a compatible host language capability," the report noted.

Conversion Strategy

Conversion of a large number of programs is normally staged in order to reduce the need for an increased conversion staff. The prime application areas – those which "most substantially benefit" from the DBMS – must be converted first, Codasyl said.

If more than straight conversion is needed, "it is sometimes good to acquire self-contained capabilities as a means to provide tools for developing redesigned applications and to simplify the task of debugging both processing and file design," the report added.

Data is of primary concern to Codasyl and the DBMS "data structure must enable the user to access data via previously defined paths and must contain all necessary data."

To enable the conversion team to relate the existing data names to the standard data names in the DBMS schema, the report calls for implementation of a data dictionary facility.

Data Basics

Warning and Solution

Then it adds a warning – "Where substantial redesign is attempted, the redesign of the data structure is a . . . problem. Errors in the definition of the new schema are certain" – before offering a solution: "System capabilities which aid in reorganizing files can substantially reduce the cost of redesign."

If existing programs are not written in a host language accepted by the DBMS, there is still hope. "Adaptive models and systems to provide adaptive programs are still in their infancy," the report acknowledged, "but language-to-language conversion processes are becoming more abundant, as are automated aids to conversion.

"If special uses are being made of data, causing high program volatility, a case can be made for acquiring capabilities to support selection and presentation," it continued, noting the needed facilities might be those which maintain private or interim files for analysis.

Interactive facilities to aid analysis and support user learning would also be useful, according to Codasyl.

Selection and Acquisition of Data Base Management Systems is available for $12/copy from the Association for Computing Machinery Order Department, P.O. Box 12105, Church St. Station, New York, N.Y. 10249.

Range of Topics Set In Courses From BCS

DOVER, N.J. – Computer-oriented training courses have been planned at six sites for this month and next by the Education and Training Division of Boeing Computer Services, Inc. (BCS).

The courses are not open to the general public, but only to personnel sponsored by their companies or organizations, BCS noted.

Classes are being held in Chicago, Detroit (Dearborn), Denver, San Francisco, Seattle and Wichita, Ks. Additional information is available from BCS representatives at the phone numbers noted in the schedule below:

Chicago (312 781-7900): Cobol Optimization, May 24-26; Project Management, June 28-July 1.

Detroit (313 271-8450): Cobol Sort and Report Writer, May 19; Cobol Table Handling, May 20; Data Base Concepts, May 24-27; Advanced Programming Techniques, May 24-27; Basic JCL, June 1-4; Project Management, June 2-4; Systems Analysis, June 7-11; 360/370 Assembler Language Workshop, June 7-11; IMS/VS Data Base Design, June 14-18; Introduction to OS/VS, June 17-18; Overview of Minicomputers, June 21-23; Mark IV Basic, June 21-25; Introduction to Teleprocessing, June 24-25; Mark IV Complete Retrieval, June 28-30; Presentation Techniques, June 28-30.

Denver (303 320-4720): People to People, May 26; Project Management, June 7-9.

San Francisco (415 964-8555): Advanced Programming Techniques, May 24-27.

Seattle (206 773-8683): People to People, May 19; Profit Through Customer Service, May 20-21; Advanced Programming Techniques, June 1-4; IMS/VS Data Base Design, June 7-11; People to People, June 11; Presentation Techniques, June 23-25.

Wichita (316 687-2824): Project Management, June 21-24; Presentation Techniques, June 28-30.

Information about future courses and locations is available from BCS, which can be reached through P.O. Box 708, Dover, N.J. 07801.

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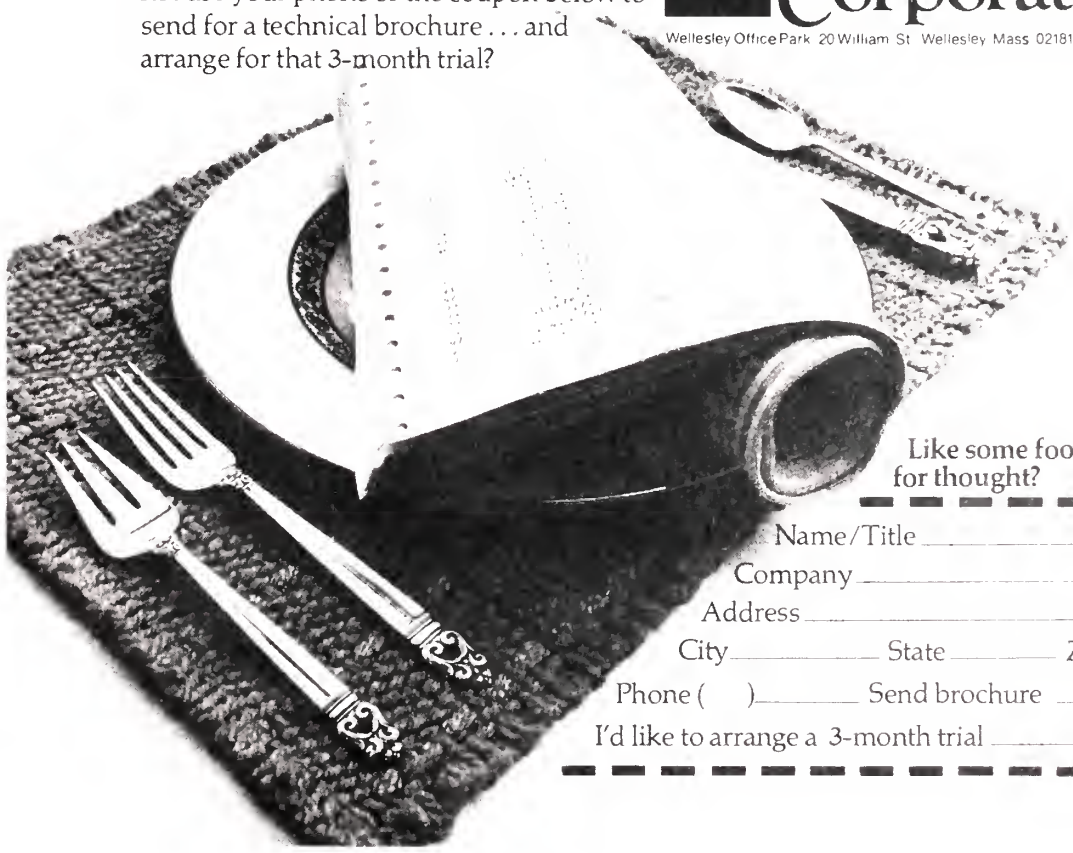

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Performance Management—Part 2

Aim at Areas With High Payoff for Users, Managers

By Larry F. Hart
And Dan Coapstick
Special to Computerworld

Armed with the indoctrination and education outlined in the first article of our two-part series [CW, May 10], users should find the development and implementation of a performance management program increasingly simple.

Performance Evaluation

After getting started, there are several steps in the development of a successful program. The first is to define the objectives of upper management.

What do the people who approve the DP dollars expect from the DP center in terms of services, user satisfaction, management information systems, accounting, payroll, development, etc.? What requirements must it serve? What criteria must it meet, i.e., production schedules, response to users, etc.?

Also, what are the constraints for performance and DP in terms of money and people. (A reasonable estimate of budget requirements for a computer performance evaluation (CPE) effort is 5% of total DP budget.)

Define Objectives

Once this is established, the objectives of the DP community must be defined in detail. Many objectives are based on the functions of each segment of the community, but there should be some general commonality of objectives among line groups and between the line groups and the center manager.

If none of the line groups share objectives with the management, a problem more serious than performance is suggested.

At the completion of this phase, an objectives tree chart is conducive to consolidation of the defined objectives for the DP community. Appropriate correlation must be identified to establish a hierarchical structure and interrelationships throughout the DP management chain.

Finally, define the level of importance of objectives and the priorities for the performance management effort. This assures recommendations made by performance management efforts will be supported by management and correspondingly justifies each such effort.

The next process is to define the measures for every objective on the tree chart with priority given to the common objectives of the community and management.

Many measures can support multiple efforts, and by defining the measures and purposes it is possible to avoid collecting proliferations of data with little potential return on expended effort.

Next, identify the accessibility or availability of the measures and all the tools necessary to collect the defined measures.

Using the priorities established – budgets, goals and commonality of purpose – the user can make the proper selection of tools to fit his immediate and future needs.

At this point a plan for the staged development of an in-house capability must be prepared. Initially, select the measure with the highest benefit return for the money and effort invested.

Historically it has been demonstrated that 20% of the application programs use 80% of the available resource. Concentrate the efforts on the smallest entity providing the most benefit.

Implement your measurement effort as planned, but realize that after the implementation there are several major points to be remembered when preparing recommendations.

If recommendations are to carry their proper impact to management, there must be cost savings figures attached. Technical recommendations without estimates of potential cost savings lack the necessary emphasis at the management level.

Recommendations must be aimed at solving the problems that are hindering the objectives of management. Correcting deficiencies does not always require acquisitions of hardware or software.

Solutions and recommendations must be aimed at the objectives of upper management to establish credibility and gain the necessary management support for the implementation of recommendations.

Hart and Coapstick are with the performance services section of CACI, Inc.-Federal in Reston, Va.

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To **really** find out how to use these new techniques takes more than reading one or two magazine articles. It takes a lot of interaction with someone who knows the techniques intimately and is also capable of explaining them and illustrating them with real-world experiences. And that's exactly what you'll get in this special intensive week with Ed Yourdon: daytime sessions with four 90-minute lectures plus optional evening sessions with workshops, question-and-answer sessions and continuations of the daytime lectures. These evening sessions will give you an important opportunity to **discuss your application** and **your EDP organization** with Ed.

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Ed Yourdon, who has [illegible] seminars of his own, has been a leader in the [illegible] movement on Structured Programming in America for the last [illegible] years. He is the author of "Techniques of Program Structure and Design" and co-author (with Larry Constantine) of "Structured Design."

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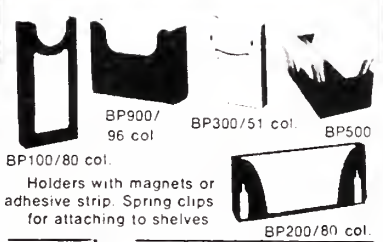

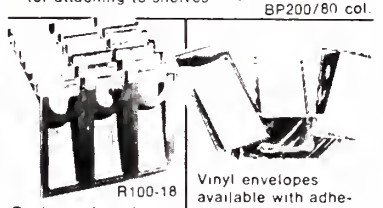

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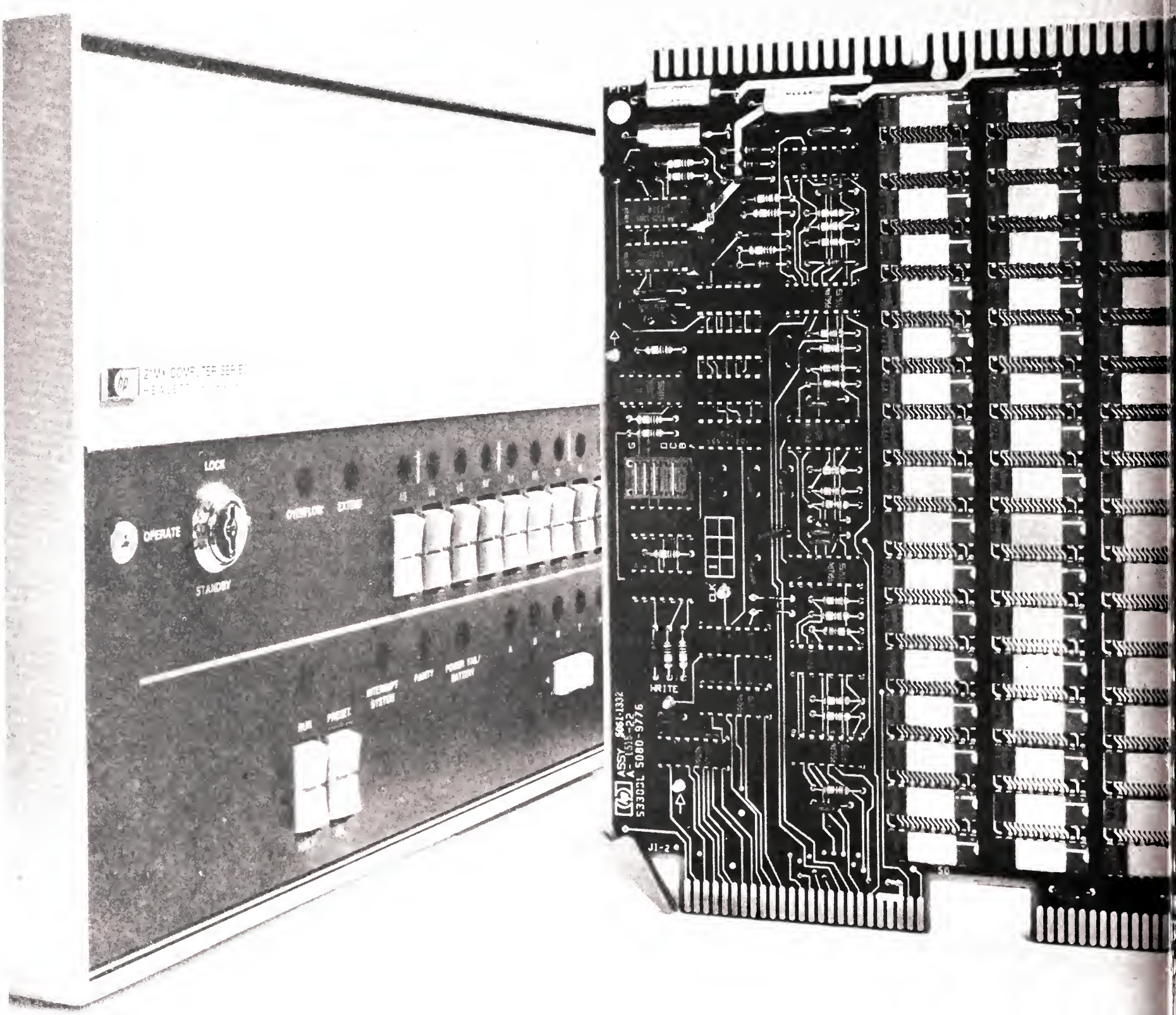
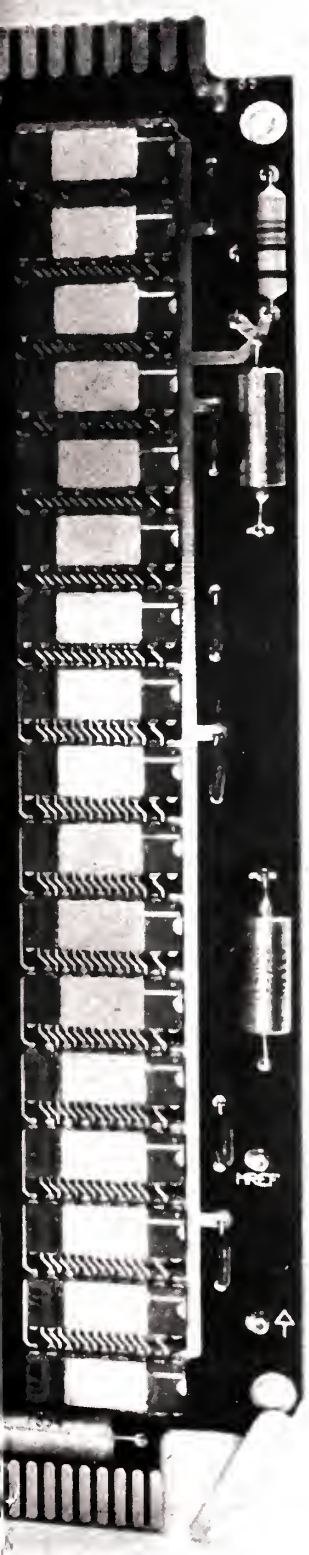
The Hewlett-Packard 21MX minicomputer sets a new price/performance standard.



Announcing 16K word memory with parity for $1386.*



Because the majority of a minicomputer's cost is its memory, the $1386 price for HP's new 16K word parity memory module is a significant price/performance breakthrough. And when you consider the low-cost memory along with the other features of the 21MX, it's a combination that's hard to beat. At any price.

Proven 4K RAM Reliability. Hewlett-Packard pioneered minicomputers with 4K RAM memory. Our unequalled field experience with more than 250,000 4K RAMS has proven their reliability. Solidly.

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†Includes CPU, parity memory, memory management, EAU and battery backup. Source: Datapro
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Current Accounting Information Handled on Mini With 'Midas'

CHICAGO – Manufacturers, wholesalers or retailers with a need for up-to-the-minute information may be able to satisfy that need with a Basic Timesharing, Inc. (BTI) mini and the Management's Interactive Data Accounting System (Midas) software from DLM Enterprises.

Midas provides "instant accounting," according to a DLM spokesman. The modular package, written in Basic, includes subsystems for general ledger, inventory control, order entry and invoicing, accounts receivable, accounts payable and payroll.

Under Midas, every transaction is posted to all related ledgers and subledgers. Since the entire accounting system is updated as each transactions is entered, Midas is always current, the company said.

A continuous audit trail is provided as each transaction is "tagged" for type, date, amount and source. Both internal and external auditors can always find out "exactly what's going on" in Midas, DLM said.

Reports User-Formatted

Reports can be formatted by the user. Flexibility in account structuring allows financial statements to be generated in the form management wants; the interactive capability provides them when management wants them, the spokesman added.

Although several of the modules can be used as self-standing systems, the integration of manufacturing and accounting activities made possible by linking the modules provides management with "full visibility and control" of company operations, he said.

Vendor support includes "as much on-site installation help as seems necessary." Since that and accessibility to client locations vary widely, the cost of the software would range from $12,000 to $20,000, according to a DLM estimate.

The company is at Suite 1632, 919 N. Michigan Ave., Chicago, Ill. 60611.

CDC Net Service Grows

MINNEAPOLIS – DP facilities just opened in Belgium allow European users to tie directly into Control Data Corp.'s Cybernet data services network based in the U.S., according to a company spokesman.

At the same time, a Canadian facility has enhanced support for users from that area, he said.

CDC also expects to provide business time-sharing and scientific remote batch services in Japan, but is unable to set a definite date for that phase.

Concrete Programs Sought

DETROIT – Data on the availability, features and documentation of existing concrete design programs is sought by the American Concrete Institute (ACI) for publication in the *ACI Journal*.

The emphasis will be on relatively small, portable application programs used in design and detailing of concrete structural elements, a spokesman said. ACI Committee 118 is currently calling for abstracts of programs related to beam, slab, column or footing design, he added.

ACI can be reached through P.O. Box 4754, Redford Station, Detroit, Mich. 48219.

Carmen Miranda's Brazil is now a thriving EDP market, and home of *Computerworld's* newest publication--- *DataNews.*

When it's carnival time in Rio, computers aren't exactly the first thing that come to mind. But in Latin America, Brazil is where the computers are — 65% of them in fact. There are 3,793 computers installations in Brazil, and the number of installed computer systems grew by an amazing 37% between 1974 and '75.

To supply these installations, Brazilian computer users imported more than $370 million of computers and computer related equipment in 1975. And that figure will be even larger in 1976, as there is a growing demand for data processing and data collection systems, minicomputers and add-on peripherals in the Brazilian market.

Why all the impressive statistics? Because *Computerworld* has a new sister — *DataNews*, the computer newspaper for the Brazilian computer community. Published by Computerworld do Brazil Ltda., *DataNews* has an initial circulation of 15,000 among top management in business and industry and other key buying influences in the Brazilian EDP market. It is now serving this community with the same kind of editorial content and quality that has made *Computerworld* a leader in the United States.

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Service Expansion Planned This Year

DDS Less Costly Than Proposed MPL: AT&T Official

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. – AT&T's Dataphone Digital Service (DDS) provides users with cost advantages when compared with its recently filed Multi-Schedule Private Line (MPL) rates, according to Wayne Robins, director of data services for AT&T.

At 4,800 bit/sec, DDS "shows a cost advantage up to about 1,900 miles" when compared with proposed MPL charges, Robins said at a session on digital services at the recent International Communications Association (ICA) conference here.

At 9,600 bit/sec, DDS "shows a digital advantage up to [a distance of about] 1,000 miles," he said.

The analog MPL rates used in the comparison represented the best solution between Category A rate centers, he added.

The MPL rates were recently filed with the Federal Communications Commission (FCC) to replace the earlier Hi/Lo private line rates [CW, April 26]. The MPL tariff proposal is now pending before the commission and will take effect on May 20 unless the commission decides otherwise.

During 1976, AT&T plans to expand DDS service by adding off-net analog extensions to users located outside major digital cities. Also planned are local intrastate DDS networks and the expansion of DDS to about 100 major cities, Robins told the conference.

DSDS Combines Technologies

Turning to AT&T's pending proposal to offer its Dataphone Switched Digital Service (DSDS), Robins said this service combines digital data technology with switching technology.

Construction of the necessary facilities for DSDS have been completed and the system is now operating with Bell system administrative traffic, he said.

Robins listed "less than 3 sec call setup" and a disconnect time of "less than 100 msec" among the planned DSDS features.

Addressing information on DSDS will be transmitted in the bit stream as "standard Ascii characters" and the service will be "code-transparent" in data mode operation, he added.

Other DSDS features include pricing sensitive to time and distance, a multiline hunt capability and billing details on calls. The system is ready to begin handling customer traffic as soon as FCC authorization is given for the service, he said.

Initially DSDS will serve users in 18 cities using 56 kbit/sec digital channels. An additional nine cities will be added during 1976, he said.

Rate elements included in the DSDS user's monthly bill will be a Switched Digital Access Line (SDAL), time and distance charges with the time portion based on a 10 sec minimum and additional 1 sec increments and a Switched Digital Service Unit (SDSU).

A user with a New York-Chicago DSDS facility will pay about $670/mo for the station arrangements and SDALs, Robins said; initial service usage periods of 10 sec will cost about 12 cents plus about 1 cent for each additional second.

Using this line for one hour per day for

(Continued on Page 28)

Supermux Among Show Introductions

By Ronald A. Frank
Of the CW Staff

WASHINGTON, D.C. – Data communications products and services were introduced by many of the more than 90 vendors at the International Communications Association (ICA) conference here recently.

Infotron Systems of Pennsauken, N.J., showed its Timeline 780 Supermux which is said to eliminate errors on high-speed links between multiplexers.

The microprocessor-controlled unit can be used to upgrade previously installed Infotron multiplexers by replacing the central logic scanner. It can intermix speeds, data rates and protocols while allowing both synchronous and asynchronous channels to contend for the same band width, the firm said.

The 780 includes a system status reporting capability which can be accessed by the user by interfacing with an Ascii-compatible terminal. The unit is described as compatible with AT&T Dataphone Digital Service (DDS) and it can accept a mix of dial-up and private-line facilities.

Input speeds to 9,600 bit/sec can be accommodated in point-to-point and multipoint nets, and up to 128 channels can be handled. The 780 is said to use a modified Synchronous Data Link Control (SDLC) transmission protocol between multiplexers in a network.

Upgrade versions of the central logic unit cost $2,500 per end, and initially installed systems cost $4,100 plus $450 per channel. First deliveries are scheduled for July.

Infotron also showed its Timeline 280 multiplexer that allows dial-up applications to use DDS, the firm said. The 280 costs $2,200 plus $300 per channel.

Western Union Information Systems of Mahwah, N.J., introduced its Remote Line Adapter RLA-2100 network processor which operates as a line control unit to the firm's earlier C-2100 front end. The RLA-2100 terminates asynchronous lines operating at up to 1,200 bit/sec on dial-up or private-line facilities.

The line adapter costs $5,000 to $6,000 depending on options, a spokesman said.

The firm also introduced the Series 1000 terminal control unit which can handle terminals used in data preparation, batch and conversational applications. The Series 1000 costs $1,500 to $2,000 with first delivery in the third quarter.

General Electric Co. of Waynesboro, Va., demonstrated its Terminet Toshiba extended front teleprinter which prints 158 columns at 1,200 bit/sec in either single- or split-platen formats.

Both keyboard send/receive and send/receive versions are available with the latter model operating with a magnetic tape cassette buffer. Four character sets, including Ascii and Japanese Kana, are available.

The teleprinter will be available in the

(Continued on Page 28)

CW At ICA

Correction

The price for NCR Corp.'s T-77 parallel-interface, read-only thermal printing terminal [CW, Apr. 19] is $2,303 in quantities of one to four units.

Reamer of IBM Elected to User Group Presidency

By a CW Staff Writer

WASHINGTON, D.C. – Raymond V. Reamer of IBM was elected president of the International Communications Association (ICA) during the annual conference of the user organization here recently.

Also elected were F. Thomas Hogan of Monsanto Co., first vice-president; Edward S. Vennum of the LTV Corp., second vice-president; Wylie R. Deakin of TRW, Inc., treasurer; and Lloyd Isaacs of Chrysler Corp., secretary. James Martin of National Steel Corp. was elected to the board of directors.

Outgoing ICA President Roger L. Underwood of Kaiser Aluminum & Chemical Corp. told conference attendees the organization now includes 370 member companies and over 900 individual members.

Membership in the user organization has been limited since last year, and a waiting list of prospective member companies has been established.

About 13 local and regional telecommunications user groups were represented by their respective presidents at the ICA conference and Underwood said a closer relationship between ICA and the other organizations would be established.

During the conference, ICA members held a closed meeting to evaluate how the user group would respond to AT&T-sponsored legislation now pending in Congress that would limit the Federal Communications Commission's (FCC) jurisdiction over the use of non-carrier equipment and the specialized common carriers.

Reactivated Subcommittee

As a result of this meeting, members voted to reactivate the regulatory liaison subcommittee. The subcommittee chairman will be Robert Bennis of Westinghouse Electric Corp.

This subcommittee will interface with state and federal agencies and will report to the ICA Technical Development and Liaison Committee, whose chairman is Walter Heide of McGraw-Hill, Inc.

It is believed individual members will be encouraged to take their own positions on the AT&T legislation, and several members indicated they were opposed to the pending congressional legislation.

In his speech, Underwood said events set in motion by the Carterfone Decision in 1968 have provided users with an "independence of choice and a chance to make dramatic differences in the costs of telecommunicating. There were a lot of people willing to take risks to help make this difference happen."

More than 600 ICA members attended the conference exhibition and technical sessions and 90 exhibitors demonstrated their products and services at the show. Next year's ICA conference will be held in Toronto, Canada in May.

ICA events are limited to members only and information about the organization is available from the executive secretary, Box 863, Mundelein, Ill. 60060.

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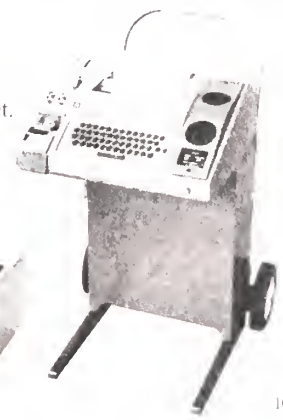
(below) *AJ 841*, the rugged Selectronic™ printer terminal. A cost effective replacement for the IBM 2741.

(right) *AJ 230*, a mobile acoustic Teletype terminal (Also available in auto-answer TWX. DDD versions).
(below) *AJ 630*, a 30 cps quiet, non-impact printer terminal with 140 character print line. (APL is an option.)



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Also Extends Existing SPD 20/20

Incoterm Adds Two Series Featuring 3270 Emulation

By John P. Hebert
Of the CW Staff

NATICK, Mass. – Incoterm Corp. has brought out two series of intelligent IBM 3270-compatible terminals and added an intelligent model to its existing SPD 20/20 series.

Units in the recently introduced Series 30 and Series 40 provide up to 64K bytes of programmable core memory storage and up to 40M bytes of cartridge disk storage. A multistation display capability supports up to 32 CRT stations and 32 printer terminals per cluster, Incoterm said.

Software support for the two series consists of Data Entry Software Levels I and II, a high-level Basic programming language and a file management software system, the company said.

The Series 30 includes a programmed airlines reservation system (Pars) and two models for IBM 3270 emulation. The terminals can be upgraded to the more powerful Series 40; all Series 30 programs can run on the Series 40 terminals, according to the firm.

The terminals in the Series 30 feature 16K-, 32K-, 48K- or 64K bytes of programmable memory; 16 1,920-character or 32 960-character CRT keystations; flexible diskette storage with Incoterm's Diskette Operating System software; and what is said to be extensive peripheral support capability.

Additional storage is accomplished with Incoterm's SPD D-250 diskette system, with 500K bytes per diskette.

Cartridge disk storage is included in the series 40 intelligent terminals and operates under the company's proprietary software system, dubbed the Program Development and File Management System (PD/FMS), Incoterm said.

Program storage of 32K-, 48K- or 64K bytes of core memory is available, as are a large display cluster capability (up to 32 CRTs) and a high-level program language, the vendor said.

A typical Series 30 terminal with dual diskettes costs $14,000, but can move toward the $50,000 mark with 16 CRT keystations; a Series 40 system carries costs from $27,000 to $65,000, depending on options ordered, the spokesman said.

For a basic 16-station cluster with IBM 3270 emulation, a Series 30 terminal system costs $38,000. A comparable IBM price for a 3270 system would cost roughly $88,000, the Incoterm spokesman noted.

In addition to the Series 30 and 40 intelligent terminal systems, Incoterm also introduced the SPD 320 LFC intelligent terminal which features local forms control.

The terminal has 32K bytes of core memory storage and can handle up to eight stations and one printer, according to the company spokesman.

Three printing terminals are offered for the SPD 320 LFC: the P165, a 165 char./sec thermal printer; the 120C thermal printer with 120 char./sec operation; and the LP 125, a 125 char./sec line printer.

The SPD 320 LFC carries a base purchase price of $14,400, he added.

Incoterm is located at 6 Strathmore Road, Natick, Mass. 01760.

Terminal Transactions

Magnetic Tape Device Has $895 Price Tag

WALTHAM, Mass. -- Micro Communications Corp. has a magnetic tape unit called the Microvox Communications Peripheral that reportedly sells for approximately one-quarter the price of a paper tape punch and reader and half the price of other magnetic tape peripherals.

The Communications Peripheral can be plugged into any 115V outlet and terminates in a standard 20 ma loop and RS-232C connectors.

The Microvox is fully double buffered and capable of operating under both local and remote control.

The unit stores 20,000 Ascii characters on a 35-ft Microvox continuous-loop magnetic tape wafer that sells for $3.50 in single quantities. Five tape wafers are included in the $895 selling price of the unit. Deliveries are scheduled for July from the firm at 80 Bacon St., Waltham, Mass. 02154.

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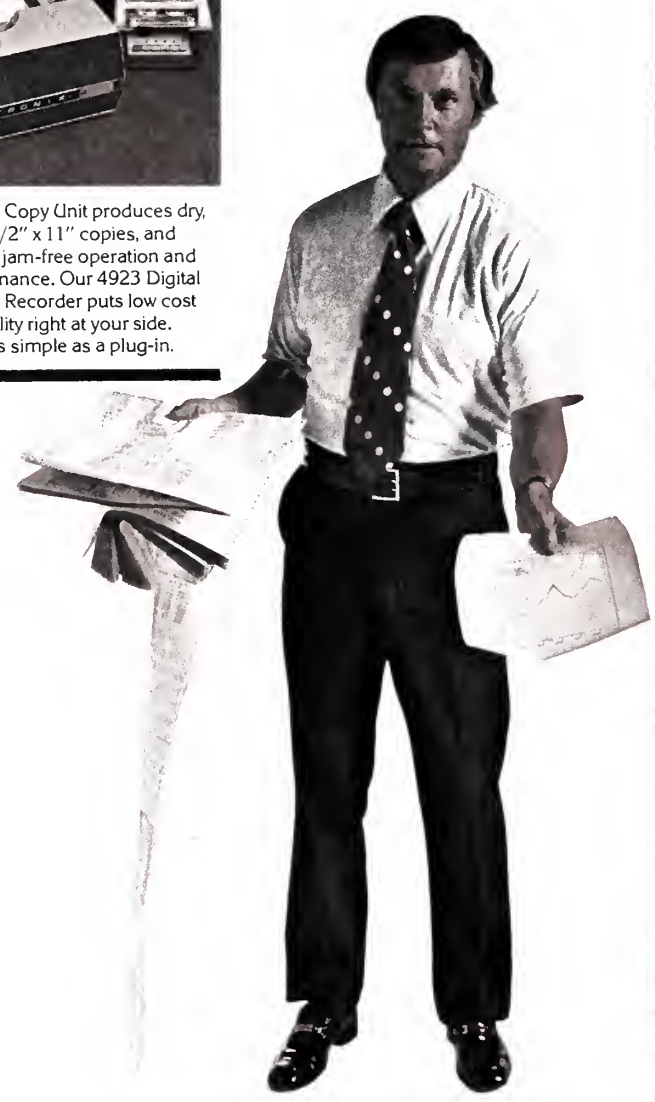

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'Intelligence' Smooths Emergency Room Procedures

NORFOLK, Va. – Interviewers of patients at a hospital here are working with intelligent computer terminals to help reduce clerical intervention in emergency room procedure so more clinical time can be put toward patients.

The intelligent terminals at the 400-bed DePaul Hospital have accomplished this goal, according to David Hilton, director of data processing for the institution.

The idea of an on-line network doing what two Sycor, Inc. Model 350 intelligent terminal systems now do was discounted because of the constant day-in, day-out nature of the application and the normal maintenance of the CPU associated with interactive systems, Hilton said.

"The terminals have proven the catalyst for rethinking and reorganization of our entire emergency room operations," he remarked.

The emergency room patient is now met by a triage nurse who determines whether immediate medical attention is required or whether the patient can continue through the interview process and then be taken in turn by the doctor.

During the interview, the patient sits down at a desk across from an interviewer who records the pertinent data through the terminal's typewriter-like keyboard for storage on the two flexible disks resident in the terminal.

In the three- or four-minute process, the operator is guided through the complete interview process – the terminal prompting the interviewer to skip a field or demanding that he enter some data into another field.

Dates, times and other variable data is also checked and verified, thereby reducing the error rate.

Because all of the operators are entering data through common programs, doctors receive consistent reports regardless of who is entering the information.

"We use the menu concept where the interviewer selects one of 10 possible functions from the menu by a single keystroke," Hilton said.

That function is loaded by way of an overlay so only the necessary code is resident at any one time.

Response Time No Problem

"Response time has not been a problem with the Sycor equipment, and although the programming is somewhat unorthodox, we are satisfied with the results," he noted.

The program is comprised of 1,076 source statements and requires approximately one hour to compile, making it quite large in terms of intelligent terminal programs.

After the pertinent data is captured on the terminal's floppy disk, it is then printed out on an attached Sycor printer in the form of an emergency room chart and given to the doctor before he begins his examination of the patient.

After the patient has received the examination and his needs have been attended to, the posttreatment process begins.

In the posttreatment interviews, the patient interviewers key in appropriate diagnosis and treatment codes as described by the doctor.

Using the facilities of the intelligent terminal, all items are validated at entry and, when possible, operator choices are displayed on the screen.

At midnight, the diskettes, which can hold three day's worth of emergency room activities, are removed from the terminal and taken upstairs where another Model 350 performs final checks on the data before loading it onto an 800 bit/in. magnetic tape drive.

The tape is then loaded onto the hospital's IBM 370/115-based computer system where it produces outpatient billing information for the business office, the patient and any third-party guarantors, among other reports.

Terminal Transactions

Paradyne Offering Modem Upgrade Plan

LARGO, Fla. Paradyne Corp. is offering a plan to allow users of its LSI-48 and LSI-72 modems to upgrade from 4,800- and 7,200 bit/sec respectively to 9,600 bit/sec.

The upgrade is available to all users anytime during the first 24 months of installation at a nominal conversion charge.

Credit is allowed for all payments made from initial installation to date of upgrade, the company said.

The modems will be upgraded at Paradyne's manufacturing facility here. The user will be provided with a 9,600 bit/sec LSI-96 at no charge while the upgrade takes place, Paradyne said from 8550 Ulmerton Road, Largo, Fla. 33540.

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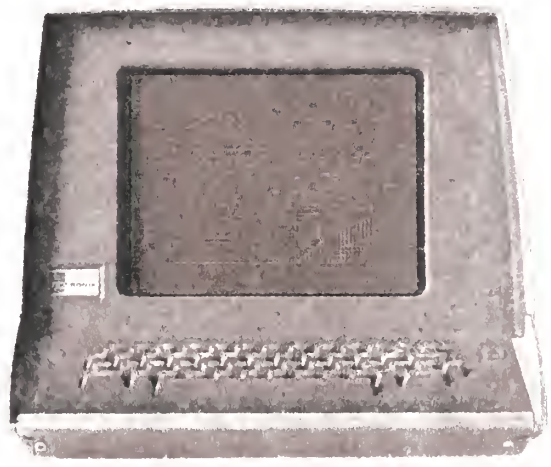

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Supermux Among Product Debuts

(Continued from Page 23)

first quarter for about $5,000 for OEM users. End-user prices have not yet been set, a spokesman said.

General Datacomm Industries, Inc. of Wilton, Conn., showed its GDC 3000 series network diagnostic control system which can operate as a microprocessor-controlled network diagnostic control system.

When operating with nets using multiplexers, concentrators or remote minicomputers, the GDC 3000 can perform network diagnostics without interfering with the main data channel, a spokesman said.

The system can remotely address up to 32 stations on a multipoint net. A typical system costs about $2,000 for the central control station plus about $700 for each remote point to be monitored.

T-Bar, Inc. of Wilton, Conn., introduced its unattended remote control (URG) system. The system can provide remote control in simple, multistation and multipoint nets to monitor, restore and reconfigure networks. A typical four-line system with a point-to-point capability costs about $3,500.

Southern Pacific Communications Co. (SP) of San Francisco said it planned to file satellite service rates "by May 23" which would provide channels on the Westar satellite (from Western Union) to SP customers.

A typical coast-to-coast circuit will cost $1,000/mo plus $45/mo per circuit termination. Service will be available 90 days after the effective date of the filing, a spokesman said.

Collins Radio of Dallas introduced a digital tandem switch for use by private corporations. The solid-state digital time-division switching system can be used for voice, synchronous and asynchronous data.

A typical system is expected to cost about $1,000/line, with delivery in about six months, Collins said.

DDS Seen Less Costly Than MPL

(Continued from Page 23)

22 business days, a user would incur a usage charge of about $911/mo; the total bill for such an installation would be about $1,581/mo, he said.

Telenet Going International

Speaking at the same session, Roger Goetz, vice-president for marketing at Telenet Communications Corp., said the packet-switched carrier has asked the FCC for authority to establish an interconnection between the U.S. Telenet network and the British packet-switched network operated by the British post office.

Using redundant transatlantic facilities provided by Intelsat, a 300 bit/sec virtual circuit between New York and London will cost between $700- and $800/mo, Goetz said.

A dial-up virtual call service, also at 300 bit/sec, will cost between $10 and $12 per hour over the proposed transatlantic link, he added.

The proposed transatlantic packet-switched service is expected to serve both time-sharing and inquiry/response customers, he said.

Access to the Telenet packet-switched network will also be extended to Canada this year, he said. This capability is being provided through an interconnection agreement with the Trans-Canada telephone system.

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Saul Stimler is the Seminar Leader

Saul Stimler is President of Stimler Associates. He is a 16-year veteran in data communications and data processing. He has provided in-house training, specification preparation, design, evaluation, performance improvement, system planning, benchmarking and project management consulting services for leading companies and government agencies in the United States and Canada. Mr. Stimler is the author of the highly acclaimed book, *Data Processing Systems - Their performance, evaluation, measurement and improvement*, and this book will be an important part of the course materials. Advance copies are available - see the coupon below.

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The Tektronix 4081 is shown here with available peripherals.

Tektronix 4081 System Handles Both Refresh, Storage Graphics

BEAVERTON, Ore. – The first of a series of computer-based, interactive graphic terminal systems combining both refresh and storage graphics information – simultaneously – has been introduced by Tektronix, Inc.

The 4081 graphics system has been designed to work effectively as a terminal in a host computer environment and, with the aid of internal programming, as a stand-alone graphics system, according to Tektronix.

Two computers have been incorporated in the 4081 which, the company said, allows the combination of refresh and storage graphics to display large amounts of graphic and textual information without flicker.

One computer is a general-purpose processor; the other is a special display processor, it said. Both are housed in a desk-style unit which also includes a 19-in. CRT display, a tape cartridge drive, Ascii keyboard with 12 function keys, joystick and an RS-232C communications interface.

Standard Software

Standard software includes a Tektronix 4014 emulator, making the 4081 compatible with the 19-in. 4014 display terminal, it said.

Also standard on the 4081 is an Intelligent Graphics Terminal (IGT) software package, which allows utilization of the full flexibility of refresh and storage graphics, local data storage and local picture manipulation by the user's host computer application software, according to the company.

Up to 40M bytes of additional local data storage is available with optional flexible and hard disks, it said.

The Graphic Operating System (GOS) is supported by 32K bytes of main memory; this standard memory is expandable to 64K bytes.

GOS is said to provide the user with extensive facilities for picture manipulation, device-independent control of peripherals, task scheduling and host terminal communications.

Optional software for the 4081 includes a programming support package which allows the user to program his special application on the 4081, Tektronix said.

Fortran will be available in three months, according to the company.

A line of input, output and mass storage peripherals is also available with the system.

The peripherals now available include two graphic tablets, an interactive digital plotter 132-column printer, hard-copy unit, tape cartridge drive and flexible and hard disks, it said.

Terminal Transactions

Basic System

The 4081 graphics system carries a base purchase price of $27,000, Tektronix said, and includes a 19-in. CRT display, display controller, 32K-byte computer with parity and a 3M Co. cartridge tape drive with 250K-byte capacity.

Lease prices for the basic system are $1,215/mo and $1,755/mo, for 36- and 12-month leases, respectively, it said.

The prices also reflect an Ascii keyboard with 12 function keys, four status lights and an RS-232C interface with program control of transmission rate from 110- to 4,800 bit/sec and parity; the GOS 4014 emulator; IGT software; and utilities, diagnostics, demonstration software, manuals and installation, the company said.

Available options include 64K bytes of total memory and 32K bytes of additional random-access memory (RAM) with parity ($3,950); and power-fail protection ($600) to preserve memory contents for up to two hours, it said.

The company's Information Display Group can be reached through P.O. Box 500, Beaverton, Ore. 97077.

Cursor-Control CRT Available

MINNEAPOLIS – Research, Inc. has introduced a cursor-control, cursor-addressable CRT terminal.

The Model 3811 Teleray has switchable wide/narrow character display and RS-232 or current-loop interfaces. It displays both upper- and lower-case Ascii characters, the company said.

The cursor is controllable by code sequences from the keyboard or from a mainframe, it said.

X-Y Addressing

X-Y addressing is also accomplished by code sequences – a series of four characters moves the cursor anywhere on the 80- by 24-character, 12-in. screen, Research explained.

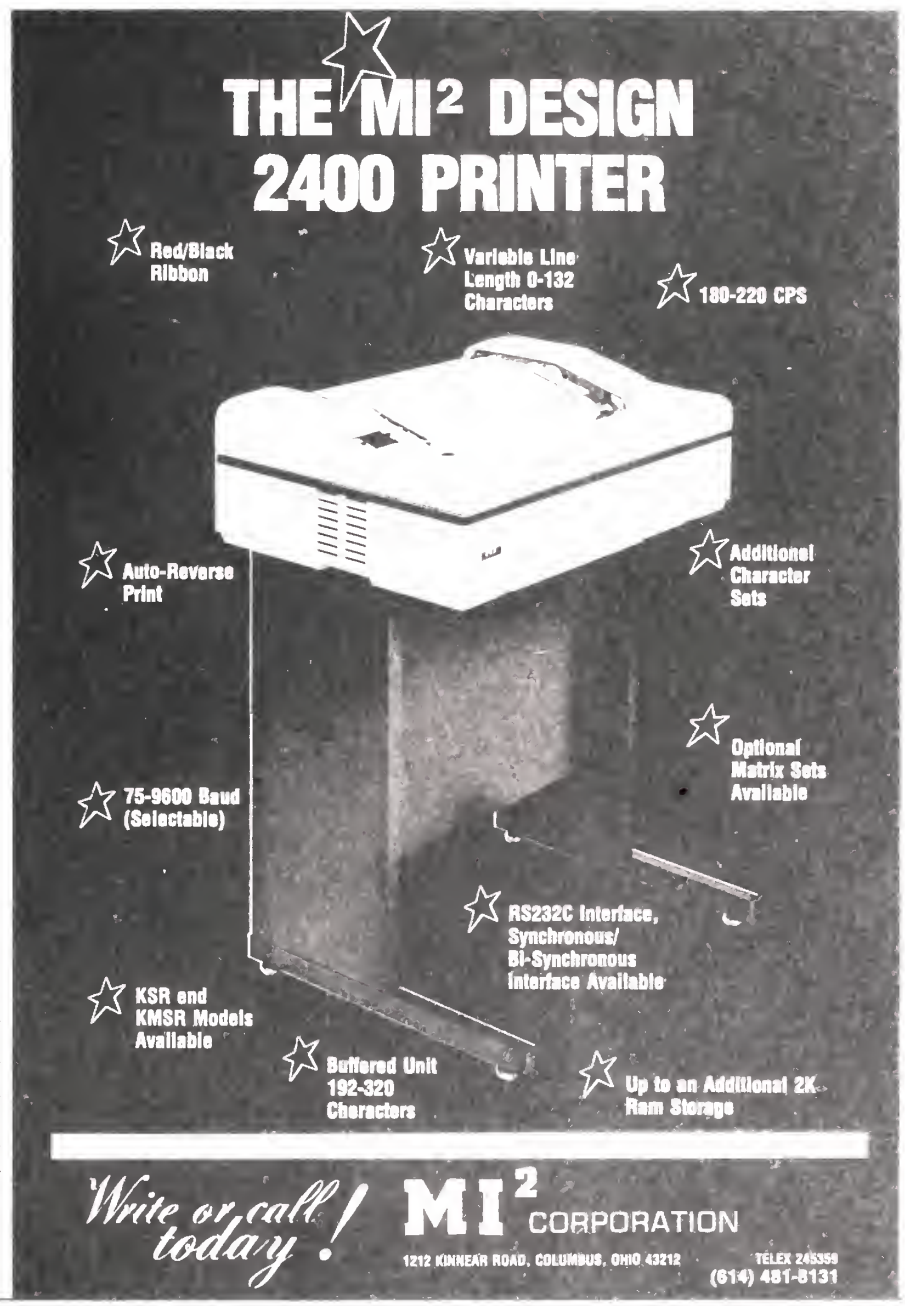
All interface codes and choice of 15 transmission speeds up to 9,600 bit/sec are set by dip switches. The unit operates in scroll or page modes, the company noted.

Model 3811 options include columnar tab, video output, peripheral interface, numeric keypad, 15-in. screen and upper-case-only character set.

The 3811 also offers Erase to End of Line and Screen Erase functions and displays a blinking block cursor, according to the company.

The unit weighs 50 lbs, consumes 80 watts of power, comes with a full-screen antireflective faceplate and is priced at $1,550 or $67/mo on a one-year lease with delivery in four weeks, Research said.

The company can be reached through P.O. Box 24064, Minneapolis, Minn. 55424.



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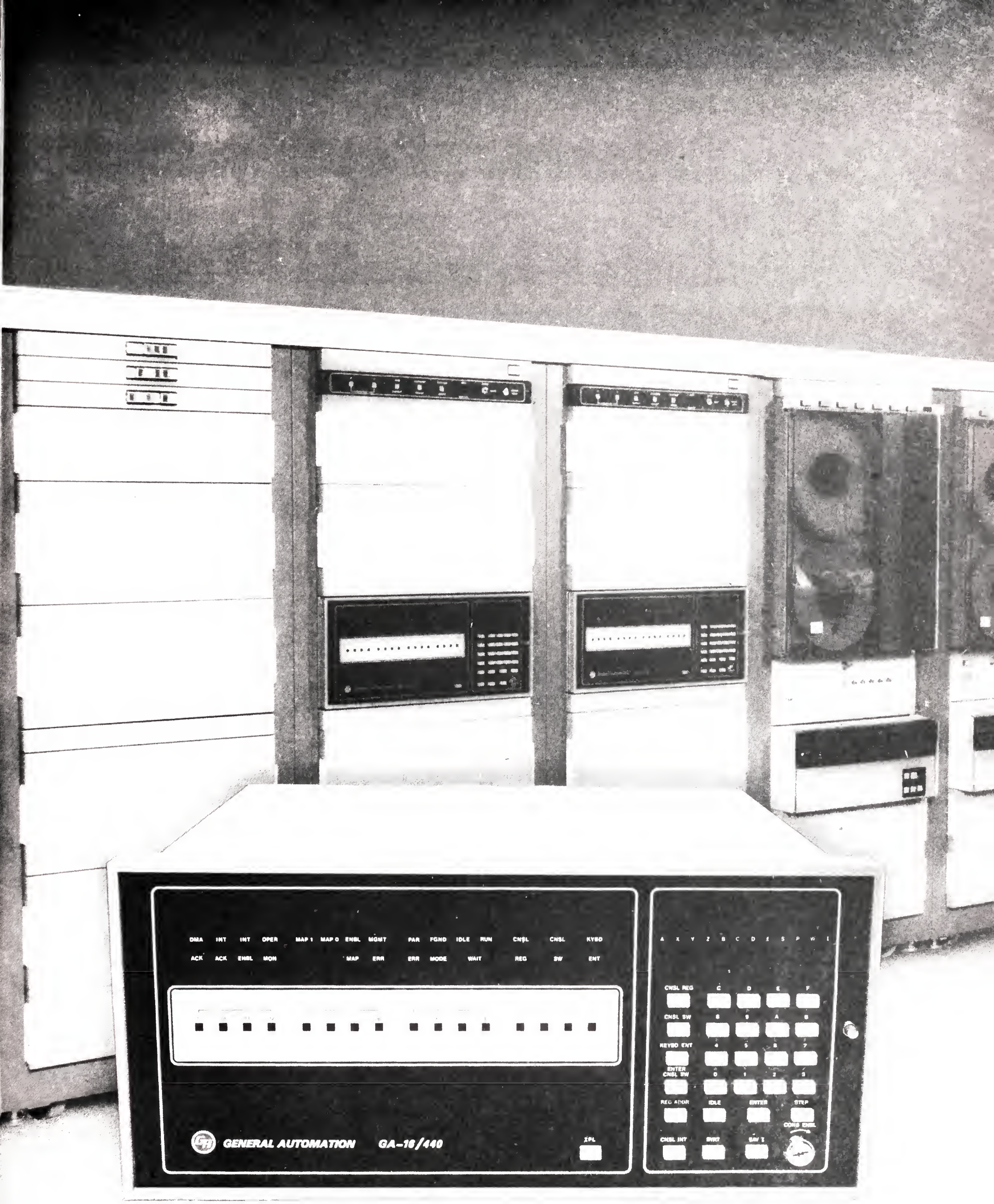
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WUIS Enhances C-2100, Adds RLAs

MAHWAH, N.J. – Western Union Information Systems (WUIS) has enhanced its C-2100 front-end communications system and introduced a series of programmable remote line adapters (RLA).

Enhancements to the C-2100 system include a Programmable Line Module (PLM) and a Programmable Line Adapter (PLA).

The enhancements reportedly provide users of Univac 1100, 418 and 494 series systems with programmable network control functions, programmable remote multiplexing, expanded communications line termination capability and flexibility in configuring networks.

The C-2100 is used in large-scale remote-access systems to interface computers to up to 256 communications lines and provide support for up to 1,024 terminals, according to the company.

PLM reportedly controls line discipline and protocols, including those in binary synchronous and data link control environments. A C-2100 system can contain up to six modules, WUIS said.

The PLA terminates a time-division multiplexed line connected to an RLA, it said. The PLA provides the PLM with independent network control functions; each PLM is capable of containing up to seven PLAs.

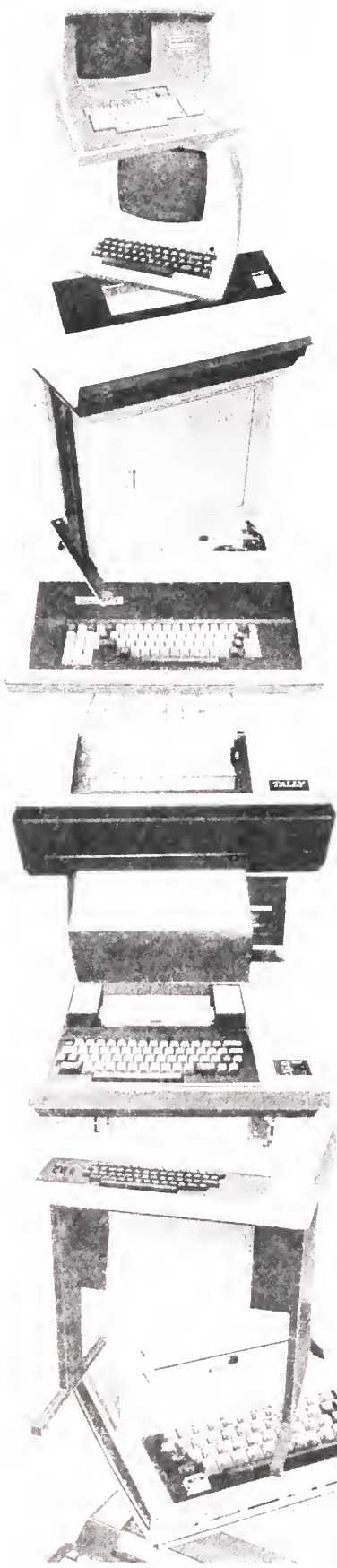
The RLA-2100 is an intelligent time-division multiplexer (TDM) which provides programmable multiplexing to support up to 20 communications lines, the company said. It is available as a desk-mount unit or a rack-mountable unit.

Automatic polling, down-line software loading, network diagnostics and fault isolation and automatic transmission rate detection and code conversion are said to be provided through the RLA-2100.

In addition, it reduces multiplexer, modem and communications line costs because it does not require a host-site TDM when used with WUIS' PLA, the company noted.

Consistent with distributed network requirements, a network based on the C-2100 system and the RLA-2100 is supported under the firm's planned network control system, it said.

Prices for the enhanced equipment are $2,500 for the PLM; $2,000 for the PLA; and $6,800 for the RLA-2100. Deliveries will begin in the third quarter, the company said from 82 McKee Drive, Mahwah, N.J. 07430.



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Modem Adapter Links Modems, Terminals With Interdata CPUs

ORANGE, Calif. – MDB Systems, Inc. has introduced a Programmable Asynchronous Single Line Adapter (Pasla) which it said provides an interface between the Interdata, Inc. multiplexer I/O bus and any asynchronous modem or local terminal with an RS-232C interface.

Pasla features include switch selection of 16 different transmission rates from 50 bit/sec to 19.2 kbit/sec, switch set device address; and separate 25-pin connectors for modems and local terminals, the company said.

The adapter also features a crystal-controlled oscillator for transmission and optional 20 ma current loop interface.

The adapter is compatible with existing Interdata operating and diagnostic software, MDB added.

All data transfers between the Pasla and modem and control lines generated and monitored to or from the data set are reportedly under program control by providing proper status and interrupt information to the processor.

In addition, line attributes, such as one of two preselected transmission rates, four character lengths, any type of parity and one or two stop bits, are also under program control, MDB said.

The device is contained on a single 7- by 15-inch half-board which is mounted in the Interdata chassis with the Interdata 16-398 half-board kit, the company said.

The Pasla interface is priced at $375, according to the firm at 1995 N. Batavia St., Orange, Calif. 92665.

Link/Chek Offers More Test Capability

NEW YORK – An extension of data link testing capabilities introduced by Com/Tech Systems, Inc. for its Link/Chek 202 system is said to allow testing in multidrop circuits as well as point-to-point links.

The Link/Chek system consists of a 202PM master unit and as many 202PS slave units as there are terminals on the communications line – up to a maximum of 128, the company said.

The 202PM addresses the selected 202PS, together checking the performance of the line-modem combination by employing a 1K-bit pseudo-random digital pattern and EIA signal status indicators, it said.

Link/Chek reportedly can be left on-line since it automatically reverts to the traffic mode after a test and enters the test mode only when instructed.

Slave units can be unattended, which is said to facilitate periodic checks originating at the master end. The master unit also may be unattended through an optional computer control of addressing, the company noted.

Link/Chek is priced at $975 or $1,195 with the computer control option. Slave units cost $595, Com/Tech Systems said from 44 Beaver St., New York, N.Y. 10004.

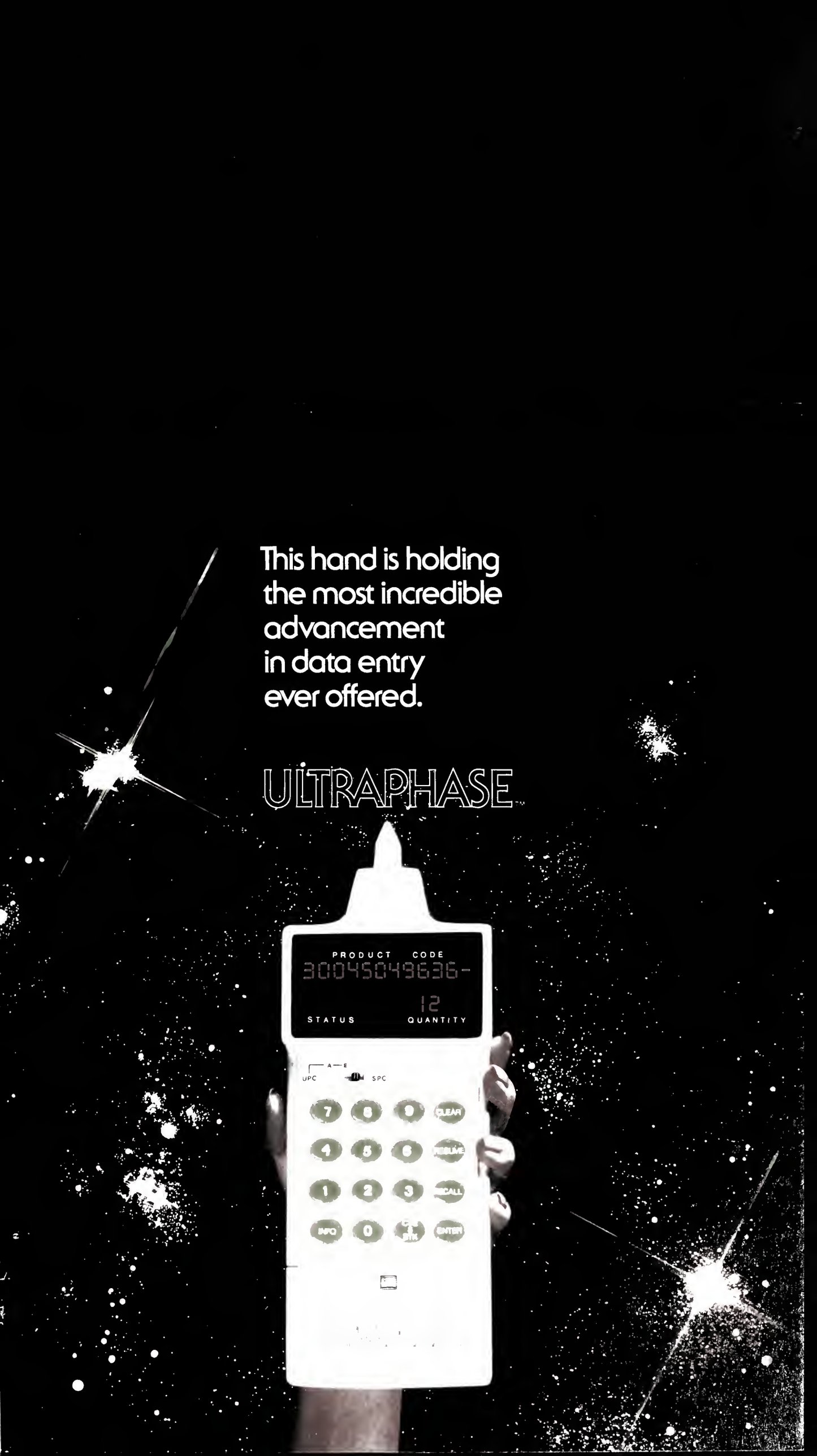
VNR Announces Dictionary

NEW YORK – The *Data Communications Dictionary* is available from Van Nostrand Reinhold (VNR) for those who are curious about or bewildered by data communications terminology.

The 530-page dictionary, authored by Charles J. Sippl, defines 14,500 terms, concepts, acronyms and abbreviations used in DP and communications, according to the publisher.

It is cross-indexed; major areas covered are communications, carrier systems, special data networks and data system equipment and components.

The book costs $19.95, VNR said from 450 W. 33rd St., New York, N.Y. 10001.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RECALL
1
2
3
RECALL
INFO
0
ENTER

Ultraphase by makes every portable

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Nothing else reads Universal Product Code (UPC), contains non-volatile memory, and is hand-held—no wires or cords. Ultraphase makes data entry simpler, faster, and more accurate than any other system.

USES:
Order Entry
Physical Inventory
Receiving
Batch and Lot Control
Etc.

It's deceptively small.

It's a solid state microcomputer that fits in your hand and weighs about 26 ounces. Because it has advanced circuitry and only one moving part, ULTRAPHASE is the most reliable data entry system yet. It is totally portable and has a shock mounted optical probe, a LED display, a 16-position keyboard, and removable Memory Packs. All in a virtually indestructible Lexan case.

It reads.

You simply whisk the optical probe across a UPC bar-coded product, shelf label, or shipping label. ULTRAPHASE reads bar codes in virtually every color and can read the code backwards or forwards. If you want shelf labels, they can be bar-coded to your existing product numbers, eliminating the need to recode your inventory. And the labels can contain item, price, date

Bergen Brunswig data entry terminal obsolete.

or other descriptive information in addition to the bar code.

Warehouse label

Retail label

It interprets as it reads.

It automatically recognizes both types of UPC (A or E) then reads and calculates the check digit for verification. ULTRAPHASE interprets the bar codes and translates them into digits. The item numbers appear—bright and large—on the LED display as fast as the probe reads the code. If an error is detected, an "E" flashes in the status position and an alarm sounds. When everything is correct, an "A" for "Accepted" appears. The scanning is done without turning on a switch. ULTRAPHASE has no power on/off switches for any procedure. It turns itself on when needed, off when finished.

It remembers.

After the bar code is read, you enter the quantity and ULTRAPHASE remembers both. All entries appear on the display for visual verification and are stored in the removable Memory Pack. At any time, stored information can be recalled and displayed since ULTRAPHASE remembers exactly where each entry is. You can review the entire contents of the memory, or may search for a specific item or group of items. ULTRAPHASE keeps track of the unused memory and informs you on request. Current memory capacities 4000 (4K) and 8000 (8K) characters are available and interchangeable.

Its memory is unlimited.

Because ULTRAPHASE stores its data in removable Memory Packs, it has unlimited capacity. You have all the advantages of solid state technology with the flexibilities offered by cassette. Essentially, the ULTRAPHASE Memory Pack is a "solid state cartridge." Each Memory Pack contains an eight-hour charge and when inserted into the service module, activates the recharge

cycle. The Memory Pack always remembers the next available location for data storage, even if the Pack has been removed and subsequently reinserted. Because ULTRAPHASE has removable 8-hour Memory Packs, the terminal can be used 24-hours a day. In addition to being portable, it can be used as a work station, utilizing a common 110-volt AC electric outlet.

It speaks.

When you are ready to forward information to a processing center, you simply slide out the lightweight Pack and insert it into the service module. Dial the center, press the transmit button and your information is sent at 120 characters per second. Transmission status is monitored and indicated on the service module.

It protects.

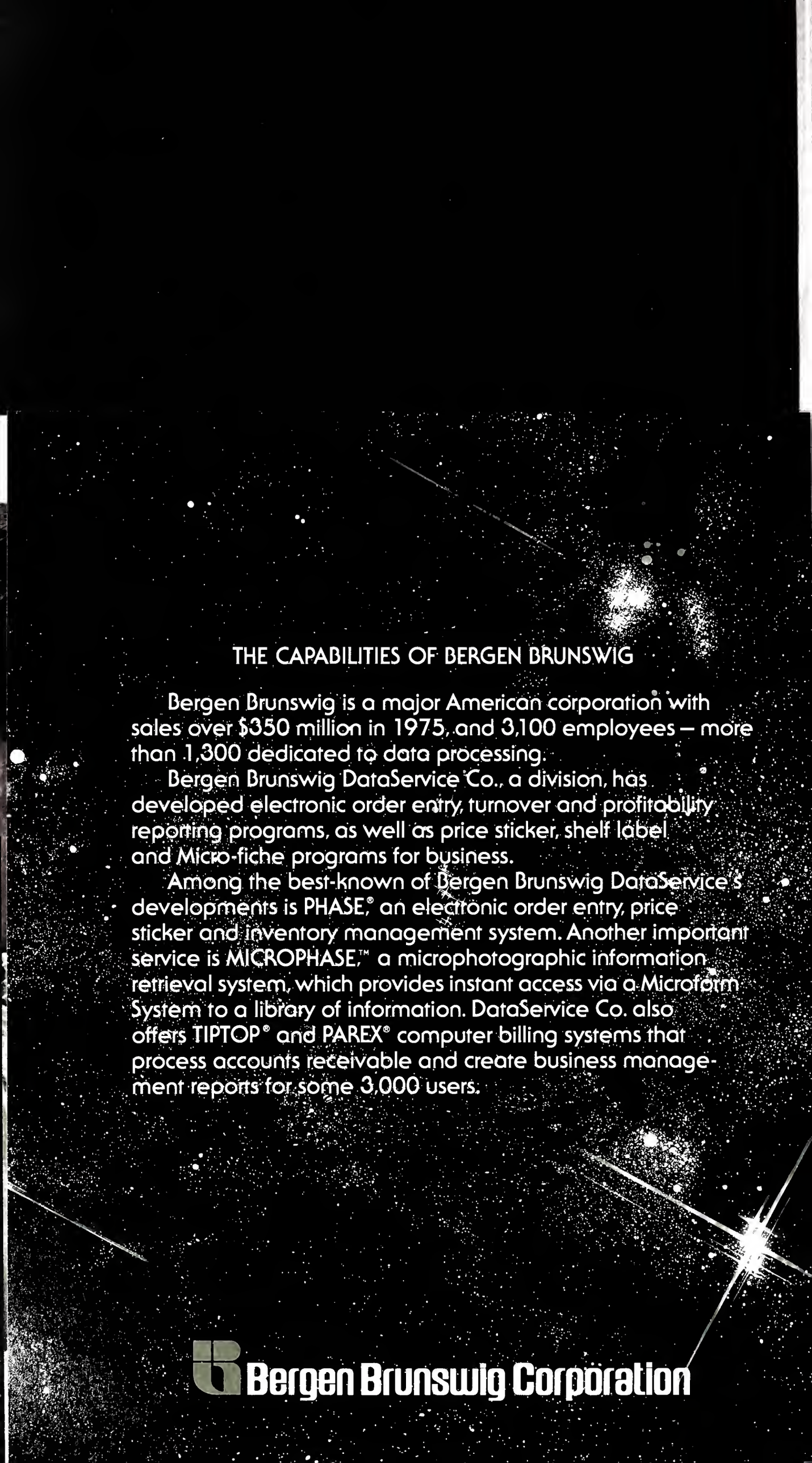
It has the ability to stop errors before they happen. It monitors the state of its rechargeable power source continuously. When it nears an unacceptable operating range, ULTRAPHASE turns on an audible alarm and refuses to take further input. All this automatically. It also lets the operator know when the Memory Pack is nearing capacity. Just prior to the end of memory, it sounds an alarm and flashes "F" for "Full" on the LED display. Finally ULTRAPHASE offers protection against accidental erasure. Since there is no on/off switch, memory can be erased only by a positive action.

ULTRAPHASE is now available in limited quantities. For information please write or call Ronald W. Zolkiewicz, Vice President of Marketing, (213) 549-4040.

Bergen Brunswig DataService Co.
1900 Avenue of the Stars
Los Angeles, California 90067

Bergen Brunswig DataService Co.

Service Module with Ultraphase Terminal Inserted



THE CAPABILITIES OF BERGEN BRUNSWIG

Bergen Brunswig is a major American corporation with sales over $350 million in 1975, and 3,100 employees – more than 1,300 dedicated to data processing.

Bergen Brunswig DataService Co., a division, has developed electronic order entry, turnover and profitability reporting programs, as well as price sticker, shelf label and Micro-fiche programs for business.

Among the best-known of Bergen Brunswig DataService's developments is PHASE,® an electronic order entry, price sticker and inventory management system. Another important service is MICROPHASE,™ a microphotographic information retrieval system, which provides instant access via a Microform System to a library of information. DataService Co. also offers TIPTOP® and PAREX® computer billing systems that process accounts receivable and create business management reports for some 3,000 users.

Bergen Brunswig Corporation

SYSTEMS PERIPHERALS

Bits & Pieces

Inforex Ups Disk Capacity Of File Management System

BURLINGTON, Mass. – Inforex, Inc. has doubled the disk storage capacity of its System 5000 file management system permitting it to handle eight 25M-byte drives.

The previous capacity was four such drives, the firm noted.

Even though the capacity has been doubled, the system still uses a single microprocessor-based disk controller, Inforex said, relieving the central control unit in the system from disk searches.

Eaeh of the drives with the system can be leased for $630/mo on a one-year contract and for $370/mo on a five-year plan.

Inforex expects to double the capacity of the unit again within the next year, it added from 21 North Ave., Burlington, Mass. 01803.

Graham Enhances Tape Evaluator

GRAHAM, Texas – Graham Magnetics Inc. has introduced the Inspector III, an enhanced version of its computer tape evaluator/cleaner.

The unit includes a feature which is said to protect the read-write head by automatically retracting the tape from the head during the high-speed cleaning and rewinding modes.

A 2,400-ft tape can be cleaned, tested and rewound in 5.3 min with the unit and Inspector III provides a printed record of the tape condition – its length and the number of errors and their loeations.

The unit costs $9,200, according to the firm here in Graham, Texas 76046.

Macro Products Introduces Printers

LONG BEACH, Calif. - Macro Products Corp.'s four plug-compatible printers are up to 51% faster than their counterparts and cost from $28,000 to $36,000 less, according to the firm.

The four printers have a speed range of 600 line/min to 1,800 line/min. They can be interfaced with IBM, Honeywell and Univac computers.

The M-260 for small computer systems prints at 600 line/min and costs $25,940.

The M-290, which prints 900 line/min, costs $29,715 and was designed for medium and large systems.

The M-470 prints 1,800 line/min and costs $38,200.

The chain-type M-550 prints 1,500 line/min – 36% faster than IBM's 1403 – and eosts $42,500.

Standard maintenance contracts of $200/mo to $300/mo are available, the firm said from 3110 E. Willow St., Long Beaeh, Calif. 90806.

Virtual Storage Coming

Criterion Extends NCR Peripherals' Life

By Ronald A. Frank
Of the CW Staff

DAYTON, Ohio – The NCR Criterion series announced recently [CW, May 3] opens up several opportunities for the company.

First, it provides an upgrade path for the present Century customer base while allowing those users to retain many of their installed peripherals.

This type of marketing strategy is similar to IBM's in that it encourages the installation of larger mainframes.

Secondly, it brings NCR into the world of virtual storage effective next year, when the necessary software is scheduled to be delivered.

Third, and perhaps most significant, the first two announced models of the Criterion line indicate larger models are yet to come.

This may depend on the success of the 8570 virtual system, which was described as comparable to the IBM 370/135 and 145.

Buried in the NCR announcement was the fact that "additional hardware" in the form of a dynamic Address Translation (DAT) box plus additional firmware will be required at $400/mo.

Also, NCR separately priced software will include portions of the operating system.

Thus far the Criterion systems are designed for transactional applications. These take advantage of the smaller processor subsystems such as those controlled by the 725, 8200, and earlier 399 and 499.

Analysis

All that NCR spokesmen will say for now is that there is a "common trunk" capability between the Century and the Criterion series.

Centurion multiprocessor capabilities and direct Century-to-Criterion interfaces are currently not possible. But if the virtual system is successful and the integrated disk controller needed for the virtual configurations is a big seller, then NCR could turn its attention to the large user.

What is missing, if large customers are to become interested, is a Criterion direct interprocessor interface capability.

Corrective Programs Can Move Operations People Off Treadmill

By Jack L. Stone
And Alexander P. Grant
Special to Computerworld

This article was written in response to those who need information on the plight of operations personnel in production-oriented DP eenters.

We should note, however, that an article this brief can only highlight the key points about this complex and difficult subject and only describe general approaches to solutions.

The implementation of corrective programs to train, develop and motivate operations personnel, including production control personnel but excluding systems programmers, is expensive – but necessary in terms of management time, money and services.

There is no simple formula for action. Each installation has its unique characteristics and must be carefully studied in regard to its management, organization, communications, job structures and related factors prior to constructing plans for personnel development.

As is always the case with personnel programs, hastily conceived projects usually produce results so negative as to be counterproductive.

This is one in a series of articles by these authors. In this article, Stone and Grant focus on the role of the operators and how management can support and encourage them. In the next, they will discuss the humanization of the training process.

Our observations of the operations personnel situation in the larger centers supporting the multiprogramming environment can be generalized and summarized as follows:

- Operations jobs have been made highly specific and vigorously routine to ease the management burden. However, the side effects have been to minimize, if not eliminate, demands on the capabilities and technical skills of the individuals involved.

The result is predictable: operations jobs are deadly dull – except when the system crashes, and then the operators have only limited responsibilities.

- Management, having successfully dehumanized the operations functions to make quasi-automatons of its people, has also concluded its automatons do not require training much beyond that required to respond to routine OS messages. This thinking pervades some of the largest and most technologically advanced computer eenters.

As a result, training levels in the machine area are absymally low. Operations people are severely limited to a small set of elementary skills, minimally sutficient to get the work out.

Informed understanding of hardware/software concepts is virtually non-

(Continued on Page 39)

CDC Has Add-On 168 Memory

MINNEAPOLIS Control Data Corp. has extended its family of add-on memories for IBM 370 systems with the introduction of its first unit for the 370/168 as well as another memory for the 370/158.

The units contain 4K-byte semiconductor memory modules which permit 370/168 and 370/158 users to expand their memory up to 8M bytes in a single cabinet, CDC said.

This allows 370/158 users to increase their memories to twice the size available from IBM, the firm noted.

The CDC 33168 main memory units for the 370/168 are available in 1M- to 7M-byte increments at prices 38% to 53% below IBM purchase, CDC said.

The memories are plug- and performance-interchangeable with original equipment and include monolithic technology, an off-line diagnostic capability and a maintenance display panel not available from IBM, the company added.

Expansion or replacement ot 370/158 memory can be done in .5M- to 7.5M-byte CDC 33158 increments that are fully interchangeable and priced 28% to 58% below IBM, CDC said.

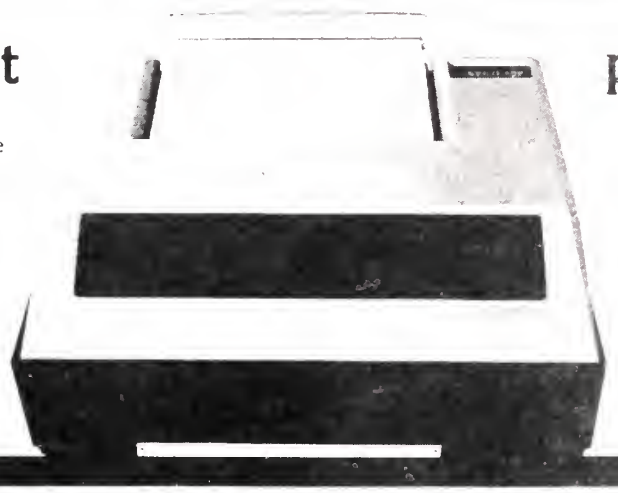
Features include dynamic memory reconfiguration in case of logic failure; compatability with virtual storage, multiprocessing and Model III systems; and the other features of the 33168, the firm said.

Purchase prices for the CDC 33168 range from $163,000 for 1M byte of storage to $895,000 for 7M bytes. Montly lease for these units on a three-year contract is $4,405 to $24,175.

The CDC 33158 is priced from $94,000 to $845,000 for purchased units and $2,350 to $22,820 per month on a three-year lease.

Separately priced maintenance also is available for both memory series, according to the company at Box 0, Minneapolis, Minn. 55440.

The printer that



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Designed to do all day data processing duty, the Series 2000 gives you multiple copies, 132 columns, 2- or 8-channel VFU, numerous character sets and fonts, foreign languages and plenty of options. And 47 different varieties of interface controllers for a fast and simple hook-up to your system. Contact your nearest Tally office today. Tally Corporation, 8301 S. 180th Street, Kent, WA 98031. Phone (206) 251-5524.

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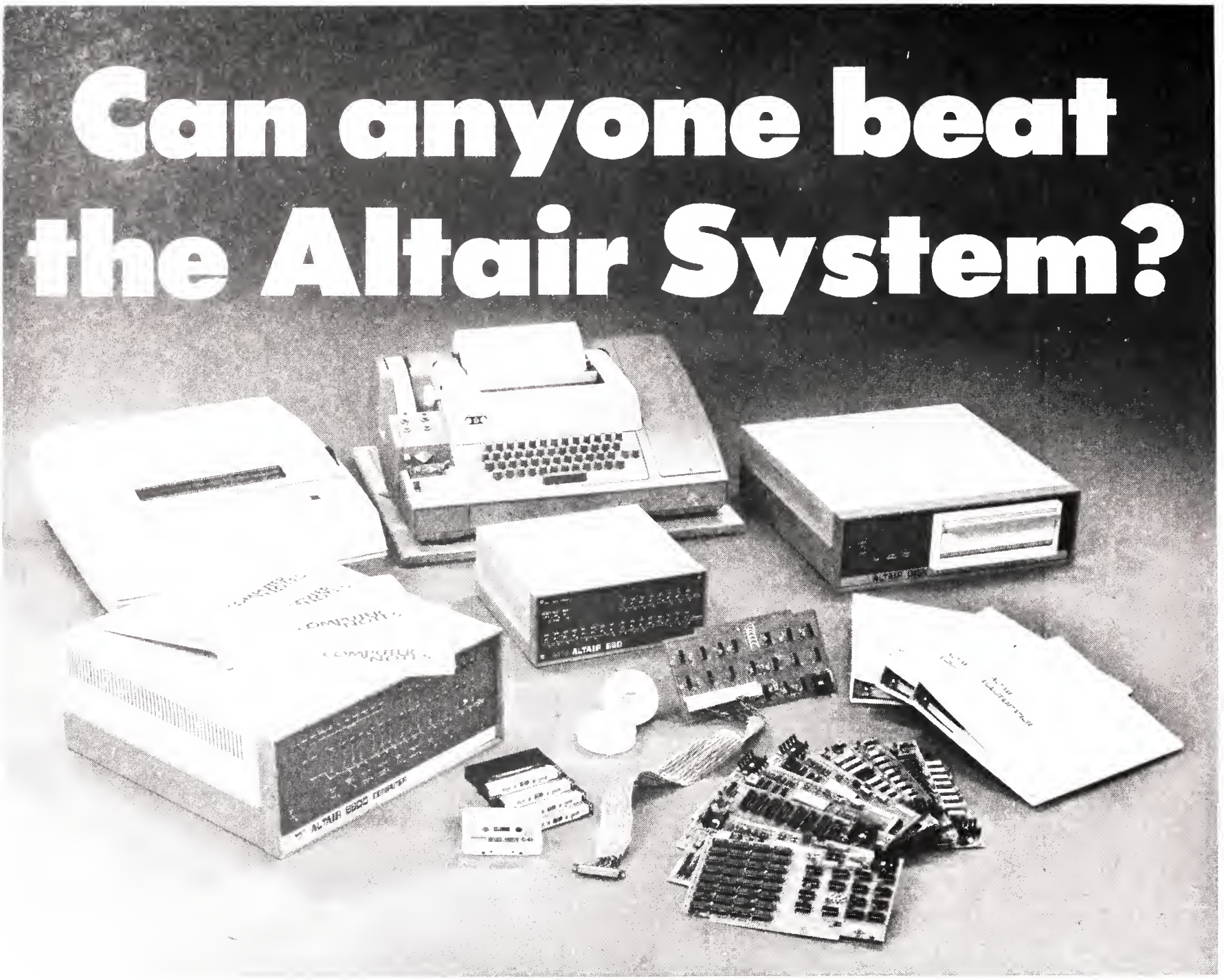
OEM Sales Offices: New York (516) 543-5444, Boston (617) 742-9552, Chicago (312) 956-0690, Seattle (206) 251-5524, Los Angeles (213) 378-0805, San Francisco (408) 245-9224. Business Systems Sales Offices: Eastern Region (201) 671-4636, Western Region (415) 254-8350

Can anyone beat the Altair System?



We doubt it.

When it comes to microcomputers, Altair from MITS is the leader in the field.

The Altair 8800 is now backed by a complete selection of plug-in compatible boards. Included are a variety of the most advanced memory and interface boards, PROM board, vector interrupt, real time clock, and prototype board.

Altair 8800 peripherals include a revolutionary, low-cost floppy disk system, Teletype,™ line printer, and soon to-be-announced CRT terminal.

Software for the Altair 8800 includes an assembler, text editor, monitor, debug, BASIC, Extended BASIC, and a Disk Operating System. And this software is **not just icing on the cake**—it has received industry wide acclaim for its efficiency and revolutionary features.

But MITS hasn't stopped with the Altair 8800. There is also the Altair 680—complete with memory and selectable interface—built around the new 6800 microprocessor chip. And soon-to-be-announced are the Altair 8800a and the Altair 8800b.

MITS doesn't stop with just supplying hardware and software, either. Every Altair owner is automatically a member of the Altair Users Group through which he has access to the substantial Altair software library. Every Altair owner is informed of up-to-date developments via a free subscription to **Computer Notes.** Every Altair owner is assured that he is dealing with a company that stands firmly behind its products.

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NOTE: Altair is a trademark of MITS, Inc.

Positive Acts Take Operations People Off Treadmill

(Continued from Page 37)

existent. We have yet to find an "experienced" operator entering one of our classes who can adequately flow-chart the job flow through the system.

- Console operators have no significant responsibility to assess and act upon hardware/software problems. They are mere onlookers to the familiar theater of the absurd: When the curtain rises on the system crash, the systems programmer rushes on stage to save the dying production process.

He sweeps aside the mere mortals – i.e., operations staff – and succors the process with his magic correctional codes.

Then, after muttering his incantations about the inadequacy of these mere mortals (operations staff again), he departs with a flourish for his microfiche mecca. Needless to say, this show really turns off the people.

- Operations personnel have deep feelings about being the subjects of discriminatory practices of management, vis-a-vis their colleagues on the systems and programming staffs.

Operations people perceive the programmer/analysts are rarely held accountable for their errors; too quick to assign blame to operations people for systems failures; given substantially higher grade and salary structures for similar levels of responsibilities; provided fringe benefits not available to operators (paid time for training and a personal library of technical manuals, for example); and travel to professional and business meetings.

- The operations department, including the manager, rarely has a role to play in the creative aspects of the operation, particularly those relating to the planning and evaluation of hardware, software and application systems.

This absence of participation eliminates a major source of intellectual challenge and professional growth for operations personnel and can result in severe disruption to the production process when new application systems are implemented without adequate notice to operations.

Peopleware

Much can be done by management to improve the production-oriented motivation of operation personnel and to strengthen their commitment to the job and the organization.

Although such actions will require substantial investments in management attention and resources, it will be even more difficult to obtain the necessary changes in management attitudes and understanding of the human needs and aspirations of operations people.

The alternatives to improving the status quo are the dark and gloomy prospects of increasing personnel turnover, decreased center productivity, rising unionism, disgruntled (and, perhaps, mischievous) employees and, at the bottom line, higher costs of operations.

'Turning On' the Staff

There are many opportunities available for "turning on" operations people. Each installation must, however, decide for itself which combination of actions provides the best prescription for its malaise.

There are three major ways this can be done. First, operations people can be given more tools and techniques to perform better in their current jobs.

These individuals feel they have done a great job for years – after all, the work has "gotten out the door" – but have been denied the same support given to programmers and analysts whom they view as coworkers.

Such support may include current information (decent run books on major production jobs, for instance); respected shift supervisors who can provide effective leadership and man/manager communications; regularly scheduled meetings to resolve operating problems; and freedom from harassment by users and systems programmers.

- Secondly, the current operations jobs can be restructured to increase the intellectual challenge to the people. Operations people are demanding relief from the routine and boredom.

Restructuring may involve delegating to selected lead personnel higher level staff assignments; giving basic systems programming maintenance tasks to operations personnel; upgrading the shift leader position to handle increased responsibilities for system problem determination; assigning the tasks of supporting job accounting and charge-back to operations personnel; expanding production control functions to provide job control language support to users; and organizing an operations documentation development section.

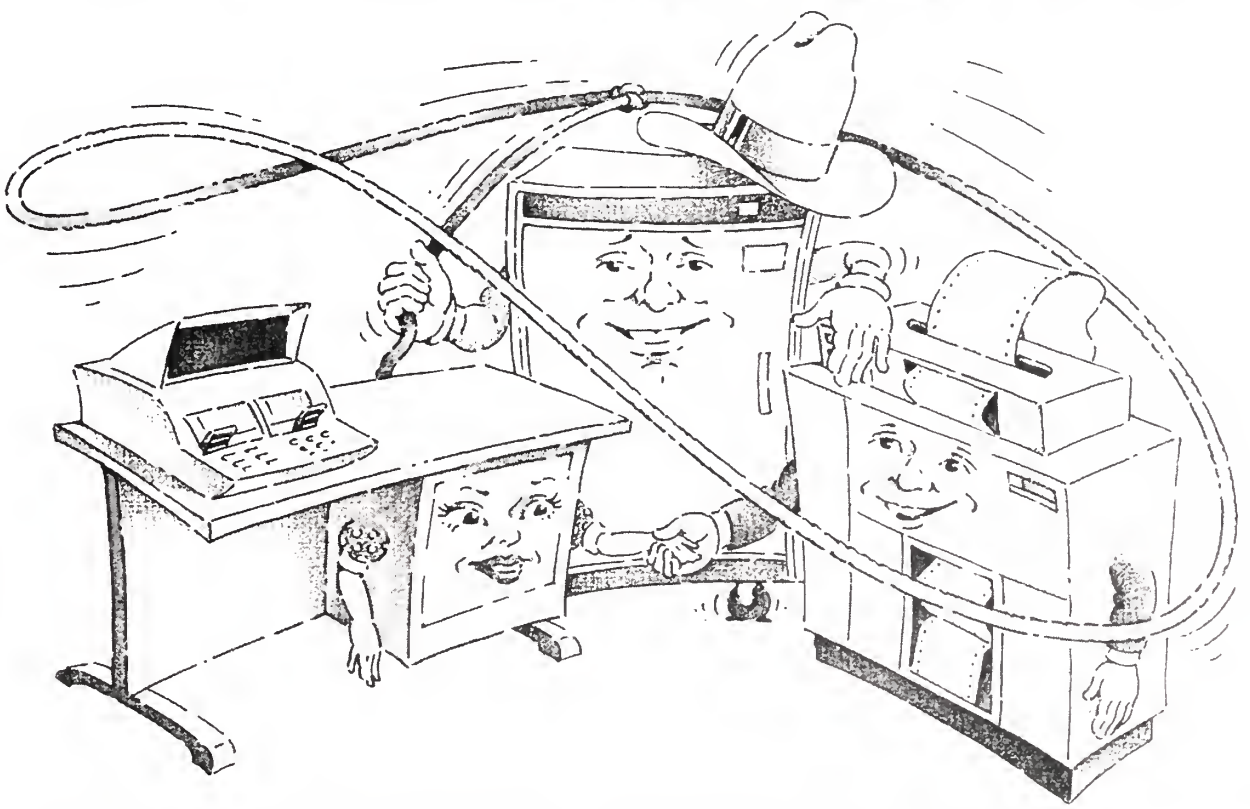
- Finally, positive actions can be taken to build programs of personal growth. Operations people are very disenchanted about their future. They see themselves on a treadmill to an opportunity mirage.

They are particulary frustrated and discouraged by the "fancy" salaries commanded by the analysts and programmers who, they feel, have not done the job in developing high-quality systems.

Such programs may include a documented career path with an advancement ladder which allows top performers both to rise in operations and to be promoted up and out to programming; formal performance appraisals by supervisors (who are both trained and skilled in the process) which provide the individual with "straight talk" on where he stands, what his past performance has been and what he has to do to grow and improve in the future; and finally and most importantly, a few sincere and personal words from the top executive, expressing thanks for a job well done.

Stone is the managing director and Grant a senior associate of Computer Education International, Inc., of Washington, D.C.

Now you can tie a top-quality printer to distributed computers.



In the eyes of many observers the development of computers has far out-stripped development of printers. As you move into distributed computing, we suggest you consider this proven method of solving printing problems before they start.

Our Grumman Printer Controller ties a wide variety of computers to the world's most renowned printer for combined reliability, speed and quality. In distributed computing it provides you with the opportunity to develop high quality, highly reliable batch terminals driven by a mini.

Our printer controller interfaces an IBM 1403 model -2, -3 or -N1 to a variety of computers, including Burroughs, CDC, Data General, DEC, Digital Scientific, IBM 1130, Univac and Xerox. We can quickly adapt the IBM 1403 to many other computers, also. For multi-vendor installations we can add a switch to your controller to allow you to connect the IBM 1403 to either of two different computers.

Users can rent, lease or buy both the printer and controller. And we are ready to work with systems designers of distributed computing, too.

For full information, call or write Joe McDonough, Grumman Data Systems Corporation, 45 Crossways Park Drive, Woodbury, N.Y. 11797. (516) 575-3034. Telex: 96-1430. GRUMMAN

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The EDP Seminar Series gives you practical applications of the newest advances in computer management. What you learn will save you time and money, because each course is geared to practical dollars and sense application.

Remember, these are seminars, not lectures, and you'll be learning by doing in a shirtsleeve atmosphere. Workshops are an important feature of the Seminars, and round table discussions and shop talk luncheons complement the seminar presentations. The workbooks and course materials are yours to keep, so you'll always have a handy reference to all you've learned.

We've selected leading experts from around the country to guide each of our Seminars. They are highly accomplished specialists in their fields, experienced in presenting their techniques to industry and management. If you're involved in one of the areas shown, you should attend the EDP Seminar Series this fall. What you learn will benefit your company, your installation, and you.

Computer/Protection Insurance Seminar

More than a dozen leading experts will be on hand to participate in this provocative new seminar on disasters that can happen with computers, and how to protect your self from them. Co-sponsored by *Business Insurance* magazine and *Computerworld*, this two-day seminar presents you with a comprehensive analysis of important subjects like these: disaster case histories, EDP facilities planning, protection planning, negotiating computer lease contracts, business interruptions and recovery costs, managing telecommunications risks, computer audits, and much more.

Cost for the entire seminar, including continental breakfasts, luncheons, dinner, and all course materials is $325 per registrant, and $300 for each additional registrant from the same company. An additional $50 bonus discount will apply to each registration received by June 7, 1976.

Chicago	Drake Hotel	June 17-18

Data Communications Course #1010 – Practical Data Communications Systems & Concepts

Dr. Dixon Doll, the nationally recognized teleprocessing consultant will lead this two-day seminar on the newest advances in data communications. The course covers areas like SDLC, HiD, LoD, DDS, newly approved major revisions to WATS, and the impact of Satellite Carriers.

Total Cost, including workbook, reference materials, luncheons and continental breakfasts is $350. Additional registrants from the same company qualify for the reduced rate of $300.

New York	Plaza Hotel	June 14-15
San Diego	Plaza International	Sept. 27-28
Denver	Denver Hilton	Oct. 18-19
Miami	Holiday Inn Airport Lakes	Nov. 15-16

Data Communications Course #1020 – Advanced Teleprocessing Systems & Design

Also led by Dr. Dixon Doll, this course is a follow up to course #1010. Special emphasis is given to techniques that minimize operating costs in commercial data communications networks. This three-day seminar covers procedures, approaches, and algorithms for evaluating and cost-optimizing network operations. Total cost, including an extensive set of customized course materials, is $450. Additional registrants from the same company qualify for a reduced rate of $400.

New York	Summit Hotel	Sept. 13-15
Miami	Holiday Inn Airport Lakes	Nov. 29-Dec. 1

Legal Tools for Computer Contracting and Protection

Under the instruction of Roy N. Freed, a nationally known lawyer, author and educator in the field of computer law, you'll learn how to increase your advantage in dealing with vendors that supply your installation. As well as practical discussion and review of your own contracts, subject areas covered in this 2½-day seminar include: Negotiations, Contracts, Warranties, Avoidance and resolution of disputes, Security, Fraud, Taxation, and Techniques for handling any transaction. Cost for the entire seminar, including continental breakfasts, luncheons and all course materials is $325. Additional registrants from the same company are charged only $275.

Chicago	Hyatt Regency O'Hare	June 16-18
New York	Summit Hotel	June 23-25

How to Increase Programming Productivity

John W. Brackett, PhD, Vice President of SofTech, Inc., will lead this two-day seminar for technical managers on the state of the art of Software Engineering. Under his direction you will learn how to: create more precise and visible analysis and design; reduce integration problems; improve software reliability; incorporate visible outputs into the software development cycle; increase programmer productivity; and improve programming management methods. Topics covered include: Structured programming; Top-down analysis, design, implementation; and Chief Programmer teams. Cost for the entire seminar, including continental breakfasts, luncheons, and all course materials is $300. Additional registrants from the same company are charged only $250.

Atlanta	Hyatt Regency Atlanta	May 3-4
St. Louis	Marriott at Lambert	May 24-25

Performance Evaluation and Improvement

Saul Stimler, author of *Data Processing Systems Their performance, evaluation, measurement, and improvement* will lead this two-day seminar on measurement techniques designed to save your installation money. As well as system performance at your own installation, topics covered include: Criteria for quantifying performance, pencil and paper analysis of a system, Benchmarking techniques, Realtime, Batch and interactive time sharing systems.

Cost for the seminar, including continental breakfasts and luncheons and all course materials is $250.

Chicago	Hyatt Regency O'Hare	May 17-18
Wash., D.C.	Stouffer's National Center Inn	May 24-25

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Note: If time is short, you may reserve space at any seminar by calling collect. Call Miriam Ober at (617) 965-5800.

For Large-Capacity Facilities

Convenience, Reliability Hallmarks of Data Modules

By Clark Davison
Special to Computerworld

Since they were first introduced to the data processing world in late 1973, data modules have become an important data storage medium.

This new approach has brought the modular design concept to random-access data storage. In a data module, all disks and heads and the spindle are integrated within a completely closed and sealed housing. This means that the potential for contamination and accidental damage to stored data is significantly reduced.

Data modules have proved to be extremely well suited to high performance, large-capacity data storage facilities for applications requiring either random or sequential processing. Examples include inventory and manufacturing control, graphic processing, time-sharing, systems residence and general-purpose storage.

Data modules are designed to operate with the IBM 3340 disk storage facility. Together with the drive, the data modules provide direct access storage for these IBM systems:

- System 370 (models 115, 125, 135, 145, 155-2, 158, 165-2 and 168).
- System 3 (models 12, 15B and 15C).
- System 7.

Provide Versatility

Data modules provide the user an unaccustomed degree of versatility. For example, with certain models of the 370 one might have as many as 64 drives and data modules on-line simultaneously, thus providing a potential 4,480M bytes of storage. Even the smallest system available today will produce a 70M-byte potential.

Additional flexibility of operation is achieved by the various methods of physically attaching the data module drive to the disk storage facility. The data module may be attached to the computer system via direct disk, integrated file, integrated storage control or through a control unit.

For the small- to medium-size user who needs fast random access to stored information, the present generation of data modules can offer immediate economies in terms of initial cost and lead the way to some most attractive ongoing benefits.

Working in concert, a typical data module and the disk storage facility have the following features:

- Start time of less than 20 sec.
- Average access time of 25 msec.
- Average rotational delay time of 10.12 msec.
- Nominal data transfer rate of 885 byte/sec.
- A choice of two basic models: 32M bytes or 64M bytes capacity.
- A third model with fixed-head access to 502K bytes of its total 64M bytes capacity.

Putting the data module to work is truly a "hands-off" act of simplicity. As the module is set directly onto the drive, the drive mechanically opens a door in the module and slides the module forward so that it mates physically and electrically with the drive.

Basically, the data module is a compact, self-contained assembly of mounting and rotation hardware, servo and data disks and built-in heads for reading servo surfaces and reading and writing on data disk surfaces.

Tolerances among all the module's components are measured in microinches and represent a sophisticated challenge in precision location. As the servo and data disks are rotating at approximately 3,000 rev/min (and in an environment up to 240° F) the heads, which move in a radial direction with respect to the spindle, must be able to move precisely to any one of several million transition points.

Utilizing the air lift created by high-speed rotation, heads in the data module fly above the surface of the disks while disks are turning. When the module is not in operation, the heads land and remain in an area where no data is stored.

One of the most critically important elements, if not the key, to the successful operation of the data module is its pre-recorded servo surface. This, in effect, is the control mechanism which directs the flying heads to the precise extraction point for each of the millions of bits of data.

One of the major advantages provided by data modules is elimination of contamination and maintenance. The data module is a completely closed and sealed system. The only time the module's door is open is for about a second when the unit is mated to the drive.

There is very little likelihood that contaminants will gain entry and cause a head crash or any other type of damage. There is no need to clean the disks or heads. There are no parts to replace routinely; there is no need for preventive maintenance. It's strictly a "hands-off" situation.

Another feature of data modules is enhanced interchangeability. The heads in the data module are dedicated to a single data surface. They are required to read only the information they themselves have previously written and thus are not subjected to the peculiarities or vagaries of other data heads.

Variable storage capacity is a third benefit and is one which will vary from one brand of data module to another. Citing the 3M Co. 948 data module as an example, the same drive will accommodate either the 35M-byte module or the 70M-byte and 70M-byte with fixed-head feature) and can be used on IBM drives modified for the fixed-head feature. The user may change his storage capacities from 35M bytes to 70M bytes simply by switching modules.

Also, data modules are equipped with a switch which protects against accidental data destruction.

Defect skipping is a feature which improves reliability and provides better performance by allowing marginal areas designated by the module manufacturer to be skipped without wasting time seeking alternate tracks.

Davison is a technical service engineer with the Data Recording Products Division of 3M Co.

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ADAPSO

Firm Opts for Mixed-Vendor Site

Switch From IBM 3 Ends Batch Era for Car Dealer

By Esther Surden
Of the CW Staff

LOS ANGELES – The IBM 3 was "getting to be a problem" and Barish-Cherney Chrysler-Plymouth wanted to switch to a true real-time on-line environment, so the firm decided to go to a non-IBM mini, Philip Cramer, the firm's DP manager, said in an interview here recently.

The primary function of the Microdata Corp. Reality system that now sits in Barish's parts warehouse is order entry. Orders come in over the phone, or people stop by for parts and the salespeople enter the orders on CRTs.

The system also does the general accounting functions for the firm, including the general ledger, accounts receivables and payables, Cramer said.

Payroll is handled by a bank for security purposes, he added.

The company considered almost all the major mini manufacturers before purchasing the Reality system. Data General Corp. Digital Equipment Corp., General Automation, Hewlett-Packard, Basic Four Corp., Cincinnati Milacron and Datapoint all were evaluated.

Some were dismissed because five printers could not be hooked up to the system. Others would not "customize" their systems or had little growth potential. Reality seemed to be the best choice, Cramer said.

The configuration the company chose has a 48K processor, 20M bytes of disk storage – one fixed and one removable, one tape drive and seven CRTs.

It also includes one 300 line/min printer, two Centronics printers (one of which has large print capability for the picking tickets), two DEC Decwriters and a Decision Data card reader with communications capabilities.

The entire system cost $135,000, Cramer said.

Microdata was willing to accommodate the mixed-vendor environment and the dealer-supplied software support for the card reader, Cramer said.

Barish has had the Reality system for six months and is still in the process of converting from the batch-oriented IBM 3/20 to the on-line real-time environment of the Reality system, Cramer said.

Not Easy to Convert

The conversion has not been a particularly easy one, but only because the environment is entirely different, he said. Record structure and the way of operating is completely different than the IBM batch world, he explained.

Cramer had been working with IBM gear for 18 years prior to the switch, although not all those years were at Barish.

The limited card capacity remains because it seems to be the most convenient way to process back orders and receipts, Cramer said.

"I haven't found a convenient way to bypass this" because of the quick turnaround document quality of cards, he said. The stock orders have 1,000 to 9,001 line items each.

The card reader is served by the independent vendor, he added.

The reader communicates to the Reality via an asynchronous line, but the firm is considering direct connect, Cramer said.

The order entry function on the system involves three companies – two car dealerships and a jobber. Between 450 and 500 invoices are run on the system each day and the firm prebills.

Five of the CRTs are dedicated to order entry and invoicing is run continuously from about 7 a.m. to 5 p.m. each day. This is possible because of the multiprogramming capability of the Real-

(Continued on Page 43)

Mini's Strength Seen in Its Specialization

By Esther Surden
Of the CW Staff

BOSTON – "The maxi's major strength is its general power and flexibility; the mini's strength lies in the fact that it can be specialized, play flexible roles and has a low price," Grayce M. Booth of Honeywell Information Systems said here recently.

"Most systems of the future will use both maxis and minis," she predicted, adding the day of multiple minis to replace the large general-purpose computer has not yet come.

"The necessary interconnections and the software to control these are too complex and costly," she said.

In a speech on hierarchically distributed information systems, Booth said such systems are configured around a host processor that acting as the primary processor and providing support services to satellite processors.

A satellite is usually a mini that depends on the host for some type of support or guidance, she explained.

During the evolution of such systems, the higher level members become more powerful and generalized while the lower level members become less powerful but more sophisticated, Booth said.

The major function of the maxicomputer is to act as the host, she noted. The large-scale system can handle complex transactions, produce complex reports based on information collected from the entire system and do long-range forecasting, she said.

Splitting Bases Impractical

Large-scale systems can support very large data bases, Booth said. While many are advocating the splitting of large data bases into smaller segments, it is difficult to do so because it is impractical for today's minis to handle this amount of information, she added.

Besides batch and time-sharing functions, large systems represent a flexible end-user facility for unplanned inquiries and reports, Booth said.

Minis, on the other hand, are very specialized. The mini's role is as a satellite processor, a process controller, a terminal controller or as a network switcher; a mini can also perform a variety of these functions at once, she said.

Minis handle the simple, the normal case, Booth added. They produce simple reports and support moderately sized data bases with local data only.

This local data is often a working copy of the host's data base, Booth added.

Preplanned operations, one- or two-dimentional operations and real-time processing are other functions of minis, she continued.

"Real-time processes are poorly done by maxis," Booth claimed.

The user shouldn't build a master-slave relationship between minis and the host computer, but should strive for "intelligent cooperation" between the two, she concluded.

Mini-Based Net Eases Loan Paperwork ...And They Said It Couldn't Be Done

By a CW Staff Writer

LOS ANGELES – Although the DP department said it couldn't be done, Citizens Savings and Loan Association has developed a distributed processing network with minicomputers to keep track of loan applications, according to the association's consultant, Don Deitch.

Every savings and loan is bogged down in paperwork, Deitch told a Computer Caravan workshop here recently.

"We needed a nonreiterative, nonreentry type of system that tracks a lender from the day we hear about him to the day the loan is granted," he recalled. The system also would have to give management total cash flow information.

When the distributed processing network is finally completed, it will include a system with a set of data files to keep track of individual loan applications. The files will be accessed by remote terminals via dial-up telephone lines, Deitch said.

The two host systems will exchange data bases at night so that in the morning they will have the same data base. And if one fails, the other can carry the system, he said.

Almost Novices

The system, most of which has already been implemented, was developed with little formal training in any form of computing on Deitch's part; he was a consultant hired with the mandate to upgrade the savings and loan's massive portfolio.

When the queue to the firm's IBM 360 seemed to prevent any experimentation, he decided to go outside of the computer room to do the work, he said.

Deitch knew what he wanted done and, with the use of a Datapoint 1100 system, managed to upgrade the portfolio, which meant converting low interest paying loans to higher interest loans to create more revenue.

The second thrust was to service the loans and so, with the background of the portfolio system, Deitch and his group set about developing the network.

The team built up a data base of 38 significant items. The idea was that no piece of information should have to be entered twice.

The network will provide reports on a need-to-know basis, Deitch said, so a branch manager or a district manager will get the information tailored to his needs.

When a loan is ready for approval, the system will self-audit itself against a set of management-set limits, Deitch said.

The total network costs about $7,500/mo, including personnel, two 65K Datapoint 5500 systems with two disk drives, a 300 line/min printer and 30 CRTs. Two modems were purchased separately from an independent vendor, Deitch said.

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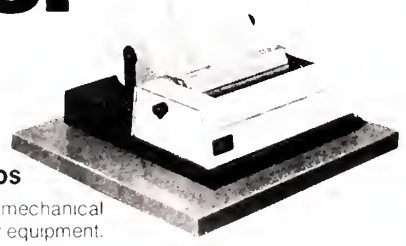

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Crime Lab Decides Security the Motive As It Picks Mini to 'Watch' Evidence

By Esther Surden
Of the CW Staff

ATLANTA – A minicomputer at the Georgia State Crime Laboratory here will soon be used to help keep tabs on evidence used in criminal trials.

The laboratory conducts autopsies, analyzes the chemical content of blood and keeps records of crime-related information.

The lab chose a minicomputer over alternative computing methods because it needs the security of an individual system, according to William S. Waldo, project manager of law enforcement systems.

"The evidence that would be logged by the system is admissible in court," Waldo stressed, so the lab doesn't want anyone to be able to say evidence has been tampered with.

Price Not Considered

After the lab had decided on a mini, a committee generated a request for proposals (RFP) without considering price: the main criteria was that a vendor be chosen which could comply with the RFP, Waldo said.

About eight vendors responded, he recalled. Some who could not supply Cobol were eliminated because the lab wanted to use a "universal language;" others simply could not meet the specs, he said.

The lab finally chose a $6,000/mo Hewlett-Packard (HP) 3000CX system.

Prior to the installation of the system, which is scheduled to become operational next month, all data was kept manually. The files became increasingly complex and the task of indexing and cross-referencing by hand was too much to handle, Waldo said.

The crime lab had asked for a system a long time ago, he added. It was bogged down in paper work, had a backlog and couldn't add enough new people to cope.

Important Function

The ability to locate evidence brought into the crime lab with only partial information will be an important function of the system.

The HP mini has 128K bytes of main memory; a 300 line/min printer; 300 card/min card reader; one 9-track, 1,600 bit/in. magnetic tape drive; two disk drives with a total of 47M bytes of storage; and six CRTs.

In addition, the laboratory plans to install eight HP Model 2640 CRT terminals throughout the state for access to the central file, Waldo said.

Car Dealer Ends One-Vendor Era

(Continued from Page 42)

ity, Cramer noted.

Every night the files are dumped onto tape and saved, he added.

Cramer does his own applications programming on the system and is using Microdata's Basic and English language to program.

It is simpler than on the IBM 3, Cramer said: "A program that took me four hours in Basic took me four months on the IBM."

The system is sophisticated, Cramer said, and includes multiprocessing and virtual memory techniques.

'Like VS2'

"It's like running VS2, except that takes 4M bytes of core," he said.

The file design is extremely "homogeneous," he added, making it simpler to work with.

Barish bought the system with growth in mind. The system can be expanded upward to accommodate its needs in the future, Cramer said.

Service from Microdata has been good, he added. The IBM service had not been very good in his area, he said.

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Sealed proposals will be received by the CDPA, 508 Robert E. Lee Building, Jackson, MS 39202, for the following data processing equipment:
Request for Proposal No. 237 for the lease or purchase of a front-end communications processor for an existing Xerox Sigma 9 computer system.
Request for Proposal No. 238 for the purchase of a Graphics Display Terminal to interface with an existing Xerox Sigma 9 computer system.
Request for Proposal No. 239 for the purchase of an IBM 370/158 CPU.
Request for Proposal No. 240 to sell an IBM 370/155 CPU.
Request for Proposal No. 241 for the least or purchase of a microprocessor capable of asynchronous communications with an existing Xerox Sigma 9 computer system.
Request for Proposal No. 242 for the lease of on-line data processing service for the cataloging of library books for the University of Mississippi Library.
Request for Proposal No. 243 General request for proposal for keyboard activated data communication terminals consisting of varying speeds and capability. Please bid keyboard-printer terminals, cathode ray tube terminals, printer devices, and graphics terminals; expected to be needed by the State of Mississippi during 1976.

Detailed specifications may be obtained from the CDPA office. The CDPA reserves the right to reject any and all bids and proposals and to waive informalities. Clyde P. Ballard, Executive Director, Central Data Processing Authority.

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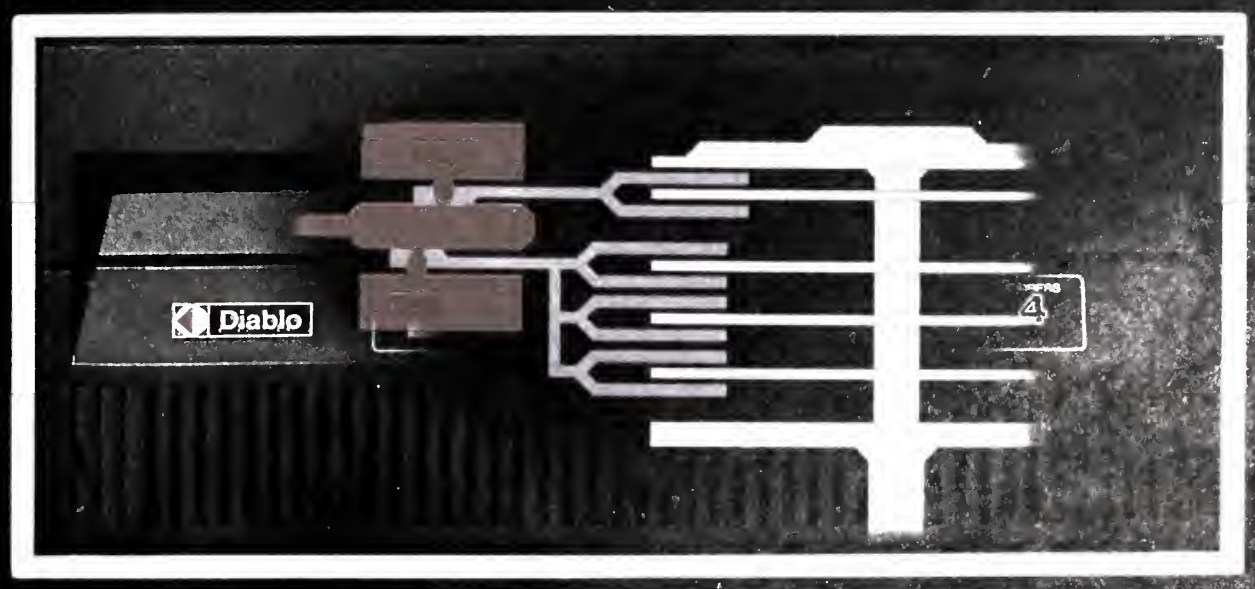

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Shugart Offering Skinny Floppies

SUNNYVALE, Calif. – The Model SA800R OEM floppy disk drive from Shugart Associates has a chassis that allows two floppy drives to be mounted side-by-side in a standard 19-in. rack, the firm said.

A pair of drives can be mounted either vertically or horizontally and can be used in a desk-top version as well, the firm said, thus its nickname "the Skinny Floppy."

The drive mechanism is based on the Shugart SA800 and features single- or double-density recording capability, IBM compatibility and a proprietary ceramic read/write recording head.

The SA800R costs $490 in 100-unit quantities from Shugart at 435 Indio Way, Sunnyvale, Calif. 94086.

Reduced by $2,000/Mo

Mini Melts Steel Foundry's Electric Bill

LEBANON, Pa. – A steel foundry here is saving $2,000/mo in electric charges by using a minicomputer to control its electric arc melting furnaces.

That figure came from Loyal Slough, DP manager for Lebanon Steel Foundry, who explained the foundry's biggest power gulpers are two electric arc melting furnaces.

These giants melt down four to five tons of scrap in one and a half hours, using about 550 kilowatt hours of electricity per ton, he said.

In order to cope with utility bills, which are based on the single 15-minute period during the month in which the foundry has the highest consumption, the firm first installed a demand-limiting meter that shut down the furnaces whenever usage approached a preestablished "setpoint."

The meter controlled the furnaces to the point it limited the foundry production somewhat, Slough said, but only controlled the high heat setting and could not forecast a peak.

Mini Lowers Setpoint

The firm decided to try minicomputer control and installed an IBM 7 in August 1973 to control the arc furnaces.

"In spite of the fact we had been averaging 6,140 kilowatts demand, we established a new setpoint at 5,900" with the mini and after four weeks stabilized to 5,500 kilowatts demand for the entire foundry, Slough said.

The system has continued to hold down electrical demand, he added, despite the addition of fans, ventilators, dust collectors and other devices in the foundry.

For the first minute of each 15-minute period, the system lets the furnaces operate uncontrolled, he said. For the next four minutes it controls to 7,800 kilowatts, and for the next 10 minutes it controls so that an average of 5,500 kilowatts is not exceeded for the 15-minute period.

Sometimes demand drops by itself as a result of an operator going to lunch or taking a break, Slough added, so the system does not have to shut down the furnace. When the system does shut down a furnace, it can start it up again at the end of the period, he said.

The system also tells management what it is doing every step of the way via printouts on a console printer, he continued.

The printouts contain the date and time, setpoint, total power drawn by all the furnaces and total plant electrical consumption, he said.

The information, printed in both kilowatts and percent of total, compares usage with the peak consumption hit during any 15-minute period during the current month, Slough said.

"If we exceed our setpoint despite our efforts, we can make the new peak the setpoint for the rest of the month, if we wish, because we are going to have to pay at that rate anyhow," he added.

The System 7 also has told company officials things about the foundry's operation it didn't know before, according to Slough.

"Our highest demand for electricity is from 8 a.m. until noon, possibly because the daytime operators are fresher then.

"The computer seldom cuts off the furnaces from noon or possibly 2 p.m. until 7 a.m. the following day," he said.

VRC Rugged Memory Available for PDP-11

NORTH SPRINGFIELD, Vt. – The Model 3401 random-access bulk storage system for Digital Equipment Corp. PDP-11 minicomputers are available from Vermont Research Corp. (VRC).

The OEM system is compatible with DEC's RC11/RS-64, VRC said, and stores up to two million words.

Average access time is 8.5 msec and the transfer rate is 4.1 μsec per word, the firm said.

The system can be used in applications where shock, vibration and atmospheric contamination are present, it added.

The Model 3401 costs $21,545 in OEM quantities from VRC at Precision Park, North Springfield, Vt. 05150.

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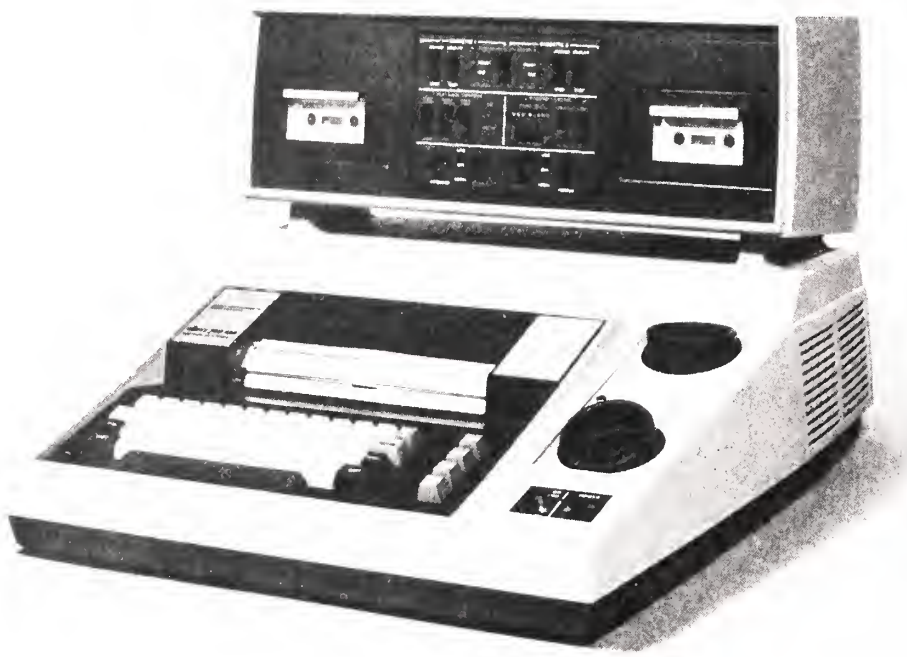

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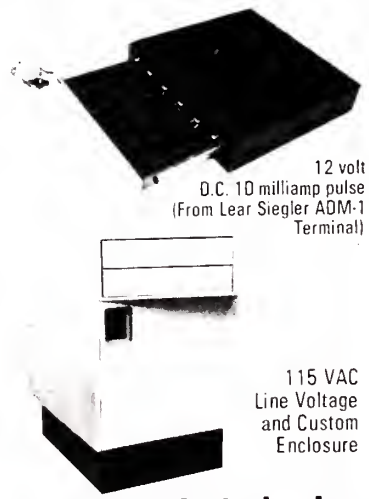

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CI Notes

Pertec to Sell Cipher

EL SEGUNDO, Calif. – Pertec Corp. has agreed to sell Cipher Data Products to an investment group led by Bill Otterson, current president of Cipher.

Terms call for a substantial part of the purchase price in cash with the balance by note along with the assumption of all obligations of Pertec in conjunction with Cipher.

"The sale of Cipher had been contemplated as a part of the reorganization of [Computer Machinery Corp. (CMC)] and completes a list of major objectives to be accomplished in conjunction with Pertec's acquisition of CMC," according to Ryal Poppa, Pertec president.

FTC Pursues Line of Business

WASHINGTON, D.C. – While the Federal Trade Commission's (FTC) effort to get 117 recalcitrant firms to fill out its line-of-business reports for 1973 was less than successful, the commission plans to file a suit soon in an effort to have the 1974 forms completed.

About 180 firms are expected to be defendants, according to the *Wall Street Journal*.

The FTC has asked 442 large companies to fill out the 1974 forms, which are "more comprehensive" than the 1973 forms.

Telefile Eyes PGI

IRVINE, Calif. – Telefile Computer Corp. is seeking to buy Peripherals General, Inc. (PGI), maker of disk systems for IBM and GE/Honeywell systems.

Telefile President S.V. Edens said PGI would probably be merged as a new subsidiary.

The move, which is subject to approval by boards and lending institutions, could lead to production of disk systems compatible with other mainframe computers, he observed.

Supershorts

Informatics, Inc. said it has sold more than $1 million in Mark IV/IMS interfaces.

Harris Corp.'s Composition Systems Division has signed a third-party leasing agreement with Trans-Union Leasing Corp. for its line of electronic systems for the printing industries.

RCA Corp. has agreed in principle to help Hughes Microelectronic Products Division and Synerteck, Inc. become alternate source suppliers for RCA's CDP 1802 8-bit CMOS microprocessor and associated peripheral integrated circuits.

Big Gains in Large Systems

Japan Increases Import of DP Systems

WASHINGTON, D.C. – The value of foreign computer systems imported by Japan increased to 51.6% of the total installed base in that country from 48.6% the year before, according to figures released by the U.S. Commerce Department.

In the year ended March 31, 1975, 2,950 foreign systems valued at $1.11 billion were delivered compared with 5,085 domestic systems valued at $1.04 billion.

The figures, compiled by the Japanese Ministry of International Trade and Industry (Miti), did not include minicomputers, process control or analog computers, on-line terminals or off-line equipment.

The largest gains made by imported equipment in the large systems category, with equipment valued at over $841,750.

In systems valued at more than $1.68 million, there were 161 foreign machines installed during the year compared with 76 domestic machines.

The category of systems valued between $841,750 and $1.68 million was more closely divided in terms of numbers between foreign and domestic, although foreign still held the lead with 150 systems compared with 145.

In terms of installed base, Japan's imported systems with values over $841,750 totaled $2.04 billion compared with domestic systems worth $1.68 billion.

By contrast, the installed base of foreign equipment with values between $336,700 and $841,750 was $603.3 million compared with the domestic base of $1.38 billion, according to the Miti figures.

Smaller in Value

Looking at the installed base by value, large foreign machines lost ground, dropping from 57.5% of the base as of March 1974 to 54.9% in March 1975.

However, medium-size machines gained, growing from 28.6% in 1974 to 30.5% in 1975.

Looking at the concentration of systems in industries, marine products led the list with a total installed base of 63 foreign systems and 23 domestic, according to the Miti figures.

Other large users of foreign systems were the finance industry, which had 3,127 foreign systems compared with 500 domestic, and security, with 100 compared with 80.

The category of associations, cooperatives and special entities had 932 foreign systems compared with 667 domestic, but the value of the domestic was nearly twice that of the foreign.

DP Forms Shipments Lead Industry Decline

ARLINGTON, Va. Computer output forms posted the sharpest decline in shipments last year as the manifold business forms industry registered its first negative growth year, according to the International Business Forms Industries (IBFI) association.

Year-end reports indicated a decline of about 4.5% in the industry's product shipments from 1974's $2.12 billion; forms tonnage may have declined as much as 8% to 11%, Edwin Masten, IBFI research director, said.

The drop in computer output forms was affected by extensive inventory cutting, IBFI said.

Discounting also depressed sales of continuous stock and simple continuous custom forms during the last part of 1975 and has contributed to the less than expected improvement so far in 1976, according to IBFI.

The remainder of 1976 should improve; forms sales could reach $2.3 billion on a 10% real growth if discounting moderates, the association noted.

IBFI sees a gradually declining growth rate as less paper and other computer output technologies cut into the continuous forms market. Industry shipments by 1980 will top $3 billion and could reach $4.75 billion by 1985, the assocation said.

CSI Sees Electronic POS Sales Reaching $582 Million in 1980

By Molly Upton
Of the CW Staff

SAN JOSE, Calif. Sales of electronic point-of-sale (POS) systems should grow from $200 million in 1975 to $582 million in 1980, according to a study by Creative Strategies, Inc. (CSI), a market research firm here.

Electronic POS systems were defined as those able to communicate externally through data storage media or phone lines.

Many of the more sophisticated electronic cash registers (ECR) have the potential to be upgraded to electronic POS systems, the study said. Some capture as many as 200 or more totals inside the machine, but are not connected to a computer or data collection device.

About 48,700 electronic POS terminals were shipped domestically in 1975. Shipments in 1980 should reach 110,000, CSI forecast.

Cumulative shipments of electronic POS units between 1976 and 1980 should reach 436,000 terminals, according to the report.

Outnumbered by ECRs

They will be outnumbered by ECRs, however, whose cumulative shipments in that period should reach approximately 563,000 units, the study said.

Domestic shipments of ECRs in 1975 were 48,300; by 1980 these should grow to 137,700, CSI predicted.

However, the value of ECR shipments is lower, ranking at $115 million in 1975 and $329 million in 1980, according to the report.

There should be a sharp decline in the market share of the electromechanical cash register (EMCR) from 33% to less than 1% of sales by 1980, the report said.

Sales Up $39 Million

Taking the three categories, domestic shipments were valued at $472 million or 184,000 units in 1975. This compared with $433 million or 182,400 units in 1974.

Sales for the three types of machines should improve significantly to reach a cumulative total of $3.65 billion between 1976 and 1980, according to the report.

The market for the three types of units should total $913 million in 1980 for a compound annual growth rate of 14%, CSI said.

Flat Year

CSI said 1975 was a flat year for POS manufacturers. Among the factors contributing to the slow year were a depressed retail environment, the tight money market, dissatisfaction with POS hardware, fear of equipment obsolescence and uncertainty about scanning systems, according to the study.

Several retail chains extended their POS implementation plans beyond 1975, causing a number of POS manufacturers to alter their business plans or drop out of the marketplace entirely, the report observed.

Breaking down the market by manufacturer, NCR captured about 40% of the ECR and electronic POS terminal shipments in 1975, securing the lead in overall installed base, the study said.

With over 25 competitors in the ECR segment, CSI said it expects only eight or nine to survive.

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THURSDAY, JUNE 17

8:30 am—9:50 am: REGISTRATION. Pick up your seminar materials and get ready for two days of information-packed sessions.

9:50 am: WELCOME. *Susan Alt,* Editor, *Business Insurance; Edward J. Bride,* Vice President, Editorial Services, *Computer World.*

10:00 am: FACILITIES PLANNING: WHAT TOP MANAGEMENT NEEDS TO KNOW. You learn what steps you can take in the planning stages to minimize computer operations risks from *Robert H. Courtney,* Director of Data Security and Privacy, IBM Corp.

11:15 am: EMERGING RISKS—CLOUDS ON THE HORIZONS. *Robert V. Jacobson,* Assistant Vice President, Chemical Bank, reviews areas of increasing risk which threaten to become major management concerns, such as theft, sabotage, physical loss, and illegal access.

12:15 pm: LUNCHEON. Take this opportunity to get acquainted with your fellow registrants. Exchange ideas and information.

1:30 pm: RISK ROUNDTABLES. Three concurrent sessions—attend the one of your choice. The sessions repeat at 3:30 pm so you can attend a total of two.

EMPLOYE DISHONESTY. *William A. Mahoney,* Vice President, Marsh & McLennan Inc., tells you how to handle a fidelity loss when the computer is involved.

AUDITING THE COMPUTER. How to make sure the computer program does ONLY what it is supposed to do . . . discussed by *Joseph J. Wasserman,* President, Computer Audit Systems Inc.

ERRORS & OMISSIONS RISKS. An examination of the many problems inherent in providing data processing services for customers, including quantifying the possible errors and omissions exposure, types of insurance available and user problems that have been experienced.

3:30 pm: RISK ROUNDTABLES. Repeat of above sessions. Attend the one of your choice.

5:30 pm: RECEPTION. Join your fellow registrants for cocktails and stimulating conversation.

6:15 pm: DINNER.

7:30 pm: NEGOTIATING THE COMPUTER CONTRACT. *Roy N. Freed* of the greater Boston law firm of Pollock, O'Connor & Jacobs tells you how a properly negotiated lease contract is one of the most effective means of obtaining relief from a problem with a computer equipment supplier.

FRIDAY, JUNE 18

9:00 am: HOW TO PREPARE FOR BUSINESS INTERRUPTION. *Paul W. Miles,* Executive Vice President, I. Berman Co., discusses the risks involved in a computer stoppage interrupting your company's operations and how you can effectively plan for recovery.

David Warren, CPCU, Partner, Warren, McVeigh, Griffin & Huntington, tells you how to fund business interruption losses through insurance and self-insurance so you get the money you need to get back in business.

10:30 am: LOSS PREVENTION ROUNDTABLES. Two concurrent sessions. Each repeats at 1:30 pm so you can attend both.

RISK MANAGEMENT: DATA TRANSPORTATION & NETWORK COMMUNICATION. *Rees S. Himes,* Assistant Vice President, Marsh & McLennan Inc., identifies and discusses various kinds and causes of losses through transporting and telecommunicating data and tells of ways to minimize and control losses.

CASE STUDIES OF COMPUTER RIPOFFS. *Donn B. Parker,* Senior Information Processing Analyst, Information Systems Group, Stanford Research Institute, takes an in-depth, eye-opening look at two examples of the computer as a tool of the corporate criminal.

12:30 pm: LUNCHEON. No speaker, so take advantage of this opportunity to discuss areas of mutual interest with your fellow registrants.

1:30 pm: LOSS PREVENTION ROUNDTABLES. Repeat of 10:30 am sessions. Attend the one of your choice.

3:30 pm: HOW TO IMPLEMENT A GOOD RISK MANAGEMENT PROGRAM. Panel members *William D. Hahn,* Principal Consultant, George Betterley Consulting Group, *Donald P. Fitzgerald,* Manager of the Management Consultant Services Division of Ernst & Ernst, and a corporate client discuss the nuts and bolts of establishing an effective and workable risk management program for data processing exposures.

4:30 pm: ADJOURNMENT.

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Canadian Service Industry Reaps $211 Million in '74

By Gordon D. Hutchison
Special to Computerworld

OTTAWA – A survey of the Canadian computer service industry showed there were 345 companies with total operating revenues of $211 million primarily engaged in providing processing, software and system maintenance, education and other computer-related services in 1974.

Another 35 companies with total revenues of $612 million were primarily engaged in providing sales, lease or rental of DP hardware services, according to figures compiled by Statistics Canada.

In addition, an estimated $100.1 million in revenues was reported by 381 companies and institutions that provide services as a secondary activity.

The report detailed information on the service bureau portion of the industry separately from sales, rental and leasing. The 1974 report should serve as a good base for future comparisons.

In terms of equipment, the Canadian service bureau industry maintained 206 computers of various sizes and 1,150 terminals, of which more than half operated at speeds of less than 1,200 bit/sec.

Establishments involved in the sale, lease or rental of hardware had 148 computers on lease and 886 terminals.

The largest proportion of these computers (83) had a monthly rental of $1,000 to $5,000, followed by rentals of $5,000 to $20,000 per month (58 computers). Only 13 computers had monthly rentals of $50,000 or more.

More than one-third of all service bureau revenue came from over-the-counter processing and one-quarter from software packages and services, the report showed.

The largest single customer of the service bureau industry was the manufacturing sector, which accounted for 20.3% of the total operating revenues of $211 million, followed closely by financial institutions (15.5%) and wholesalers and retailers (15.7%).

Government Business Small

Despite the concerted move by government to contract its service bureau requirements to industry, all levels of government combined accounted for only 19% of revenues, or $39.7 million, in 1974.

Of total direct expenditures for DP hardware – $221.8 million – some 26% or $56.9 million went for goods manufactured in Canada. Rented equipment, however, was almost totally imported, with a mere .42% of income coming from the rental of Canadian-made equipment.

As it is more likely that larger processors would be rented or leased and smaller dollar items sold, it is reasonable to guess that Canadian companies are making the small computers, some peripheral equipment and data communications gear.

For the 35 establishments engaged primarily in providing sales, lease or rental of DP equipment, the total operating revenue was derived from processing and software ($45.9 million); sale of equipment and all other goods purchased for resale ($164.8 million); sale of goods manufactured by Canadian companies ($57 million); and lease or rental of equipment and goods acquired for lease or rental ($304.6 million).

Financial institutions were the largest single sector of the economy operating their own computer gear. Their exact participation is not known because of the security restriction of the Statistics Act.

The manufacturing sector, the largest known sector, accounted for 16% or $98 million of sale, lease and rental income. If all government activity was aggregated, it would have accounted for 13.5% of revenue, or $76.7 million, plus whatever contribution crown corporations would make to the total.

Next to processing services, establishments providing computer services as a secondary activity generated the largest portion of their income from the single rental of their hardware.

Of those engaged in providing services as a secondary activity, manufacturing companies accounted for $19 million, government for $16 million, finance for $15 million and education for $10 million.

When combined with other organizations providing services as a secondary activity, these organizations realized total operating revenues of $100 million in 1974.

International News

Japan Seen Topping All But U.S. as User If Miti Program Met

TOKYO – Japan will become the world's second largest computer user by 1980 if a five-year plan developed by the Ministry of International Trade and Industry (Miti) reaches fulfillment, according to a recent article in *The Japan Economic Journal*.

The plan calls for Japan to have 75,000 digital general-purpose computers installed at the end of fiscal 1980 compared with the 36,400 installed at the end of fiscal 1975.

This represents an installed base worth $18.43 billion by 1980, which is a 2.4-fold rise from the base installed by the end of 1975, the journal said.

Miti expects installations of large-scale computers to increase at an average annual rate of 20.7% during the five-year period, boosting large-scale computers' percentage of the total installed base to 62.7% by 1980, compared with 58.5% at the end of fiscal 1975, the journal said.

Miti suggested stress be placed on developing programs to help jobs of computer programmers.

It considers upgrading of computer utilization a "must" for coping with the future economy and society, which will become more information-intensive, the newspaper said.

Thus, Miti will support domestic computer makers through its subsidization policy and other measures, it added.

Miti calculated the target number of computers installed from recent trends in computer utilization and the progress in the evolution of the information-intensive society in the U.S., which is the world's largest computer user, the journal said.

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Customers 'Good Advisers'

Incoterm Products Reflect User Demand

By Molly Upton
Of the CW Staff

NATICK, Mass. – Incoterm Corp.'s recent product announcements reflect customer demands, according to M.R. Clement Jr., vice-president of marketing.

"Customers have been good advisers," he added.

M.R. Clement Jr.

The additional features of Local Forms Control (LFC), a terminal-oriented file management capability, as well as floppy and cartridge disk capacities reflect the increasing trend to do much of work off-line, he said.

Incoterm was founded to develop programmable terminals and, as a result, has developed its own CPU architecture and software that are oriented to moving data quickly, Clement observed.

He defined a terminal as intelligent if it reacts to a real-time situation.

In all Incoterm's products, programs reside in core since this offers better protection than solid-state, he said.

Incoterm is seven years old and now has about 700 employees. During 1975, sales reached $32 million, up 50%.

"I don't know how we'll beat this one," Clement commented.

Market Promising

The market for intelligent terminals is growing at a 40% rate and indications are that the market is increasing for the independents, according to Jean Tariot, the company's president.

The integrity of the independents has been pretty well established and the firms are doing well, he said. They are also coming out with new applications as the central software improves and there are smarter users around, he said.

In estimating the independents' market size, Tariot noted four companies – Datapoint, Four Phase, Sycor and Incoterm – probably shipped about $200 million in 1975. The independents' market is therefore about twice that size, he said.

"What counts to us is the market available," or the users willing to look to independents, he said.

In installing a system, Incoterm will typically do the first set of programs, taking turnkey responsibility for installation, Tariot said.

Software included in the myriad of recent product announcements were Basic, Level I and II data entry software that is said to permit the use of English, and Program Development and File Management System.

As if setting its house in order before adding still more products, Incoterm revamped its product designations into the SPD 10 and SPD 20 families.

The 10 family includes two series, the 20 and 25, while the 20 family now has three series: 20, 30 and 40. (See story on Page 24).

With these products, Incoterm said it has reduced the cost per operator station to below industry norms.

Long known for its products in use by airlines, shipments in 1975 to airlines accounted for less than 20% of the firm's business, Clement said. However, on an installed basis, the airlines are the largest segment, Tariot added.

CW Photos by M. Upton

Jean Tariot

Bookings from banks were good last year, Clement said.

In addition to its 10 and 20 family, Incoterm also has a 7000 terminal for bank tellers as well as a license from Transac to manufacture automatic tellers.

Other major market areas are railroads, hospitals, law enforcement agencies and state and federal government organizations.

Orders & Installations

J.G. Lane, Inc. of Los Angeles has installed Logabax keyboard send/receive hard-copy terminals for its time-sharing system.

Broyles & Broyles, Inc. of Fort Worth, Texas, has ordered a PDP-11/70 from Digital Equipment Corp.

Nashville Bridge Co. has installed a Univac 90/30 system, including four 8416 disk storage subsystems, a 0770 printer and a 0717 card reader.

The Baylor Co., a division of Sedco, Inc., has ordered an offshore data collection, reduction and display package called DVS-10 from Polaris Computer Systems for a mobile drilling platform environment.

Acme Foundry & Machine Co., Inc. of Blackwell, Okla., has installed a Burroughs B700.

Bath Iron Works Corp. has installed the first of four Loadmax-200 digital loading computers from Raytheon Co.

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Goetz Cites Bundling

IBM Policy Discouraged Operating Systems Mart: ADR

By Nancy French
Of the CW Staff

NEW YORK — If IBM had priced operating systems separately when it unbundled its applications programs and services, many independent software firms would have developed and sold operating systems for use on IBM systems, according to Martin A. Goetz, senior vice-president of Applied Data Research, Inc. (ADR).

Given the complexity of an operating system and the resources it takes to build one, it would not be a "prudent" business decision to attempt to sell one against IBM's "free" systems even if a firm could make a better one, he observed.

In 1965, however, IBM's operating systems were relatively simple; many independent software firms had both the talent and the financial resources to build them, Goetz said in testimony on behalf of the Justice Department in its antitrust suit against IBM being tried here.

ADR, for example, had a great deal of experience with sort programs and built seven or eight such systems for various equipment manufacturers and government agencies. ADR also built the first Cobol compiler for RCA, he said.

Today, IBM's operating systems are so complex it would take a consortium of companies to compete, he said, but if it were profitable, companies could build them.

Charges 'Inefficiency'

Goetz came down hard on what he called the "inefficiency" of IBM's operating systems, saying some had hundreds and thousands of errors. Further, these operating systems used far more computer overhead than necessary, he said.

IBM was capable of building better operating systems and, with competition from firms such as Computer Science Corp., Computer Usage, Informatics and ADR for example, IBM would have been forced to do so, Goetz testified.

Goetz also attacked IBM on "slippages" which he said he had seen occur between the time an operating system was announced and the time it was delivered. This seriously interfered with users' planning, he said.

If a user wanted to correct an error in an operating system or obtain a new feature, he had to move to the latest release of the operating system, he added.

Goetz also hit IBM for what he called "account control." IBM exercised this control by pressuring middle management to buy new products by selling top management on going with IBM, he said.

Couldn't Provide Details

Under cross-examination, Goetz was pressed for names of users, dates and numbers which in most cases he did not seem to be able to provide, saying he relied for details on ADR employees and articles from technical and trade publications.

However, despite the fact that Goetz brought in published articles to support his general statements on operating systems and users' difficulties with them, IBM attorney Paul Dodyk refused to permit any to be introduced into evidence.

Instead, Dodyk hammered away at Goetz's credibility, forcing him to admit he himself was not familiar with such things as the code used to implement IBM's OS/VS 1 or OS/VS 2 or the criteria its designers considered in its development.

Although he had criticized the efficiency of these operating systems under direct examination, Goetz admitted he had never measured their efficiency and there was no standard for determining how much core an operating system should be expected to use.

He also indicated he had no knowledge of operating systems other than those built by IBM.

Even ADR 'Slipped'

On the subject of "slippages," Goetz admitted that even ADR slipped on its delivery schedules, and ads showed it had slipped on nearly every version of Autoflow.

Questioned on how ADR corrects errors in its software products, Goetz said unless the problem is "catastrophic," it asks users to wait for the next release, just as IBM does.

As for account control, Goetz admitted his firm never even tried selling to top management.

Although he testified IBM had solicited help from independent software companies in building the Isam portion of DOS, and ADR received such a solicitation in 1966, Goetz could not produce the document.

Repeatedly Questioned

When Dodyk suggested IBM's records showed no such invitations to bid on this work had ever been issued, Goetz said he could have been wrong – that perhaps it had been the Isam used in the OS operating system.

Because the defense attorneys found much of Goetz's testimony "contradictory," Dodyk repeatedly posed the same questions hoping to produce a set of consistent answers for Judge David N. Edelstein's consideration. Edelstein is the sole arbiter of the case.

Schultz Resigns Post As Decision Data Head

HORSHAM, Pa. – Loren A. Schultz and Frank H. McPherson have resigned their positions as president and vice-president of marketing respectively at Decision Data Computer Corp.

Winfield Shiras, a partner in the consulting firm of Grisanti & Galef, Inc., was appointed acting chief executive officer of the firm.

Richard L. Schwab, formerly vice-president of sales and service, was named vice-president of marketing.

In addition, Richard F. Taylor, vice-president of operations, was designated acting chief operating officer.

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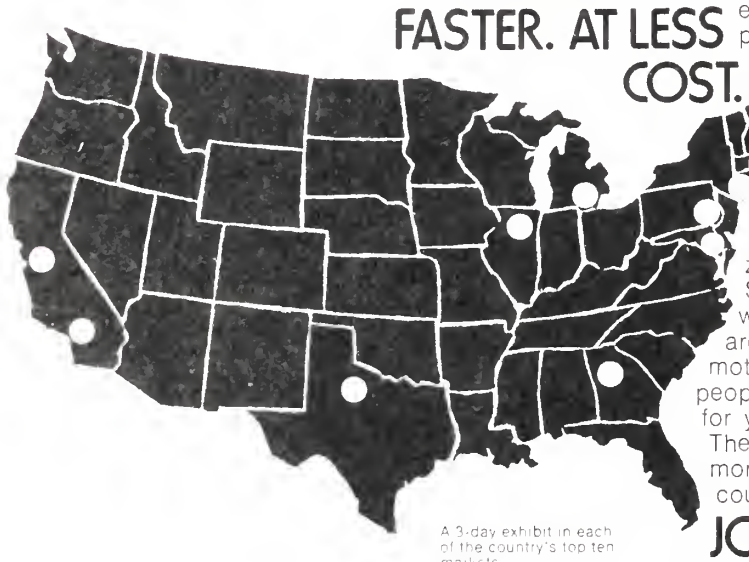

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ADR Claims Software Industry Record With Installation of 5,000th Product

PRINCETON, N.J. – Applied Data Research, Inc.'s (ADR) Software Products Division has installed its 5,000th software product, at The Kiplinger Washington Editors, Inc. in Washington, D.C.

This is a record in the number of products installed by any independent software firm, according to John Bennett, ADR president.

The company was formed in 1959 to provide software services and in 1965 began to market software products.

The 5,000th order was for Roscoe, an on-line programming system. ADR's The Librarian system was installed at Kiplinger in 1974

Reminiscing about the background of ADR and the software industry, Bennet called the software industry one of the great growth stories of the 20th Century.

Educated forecasts are that the next 10 years will see 25% to 30% growth each year. ADR anticipates at least 1,000 new customers a year, Bennett noted.

"The history of ADR's Software Products Division is the history of the industry," he said.

Even though the industry had its recognized beginning in 1969, ADR was developing software products as far back as 1965. While early software products were sold by people who were essentially technicians by mail, over the phone or by one technician talking to another, ADR sought out potential users, educated them to the uses of its products and ensured proper followthrough, Bennet said.

Bennett believes ADR's follow-up program is unique among software manufacturers. After installing its product and training people within the user organization, ADR stays in contact throughout the years, he observed.

Every account has a technical support representative as well as a salesman assigned to it, he said.

During the recent economic crunch which the software industry did not escape ADR did not retrench, but hired additional support people, he added.

Products Used Worldwide

ADR's international division, in operation since 1967, has its own technical field support people to assure the same level of service as U.S. customers receive, Bennett said.

ADR claims many "firsts" in the industry. These include:

- It was the first company to market software products nationall (1965) and internationally (1967).
- It was the first to receive a patent on a software product (Autoflow II in 1970).
- It was the first to have a software product listed on the General Services Administration Schedule (1967).
- It was the first independent software firm to reach $30 million in software product sales (1975) and the first to initiate a formal follow-up program for all installations.

Martin Goetz, director of the Software Products Division, said the independent software companies have established an enviable reputation with products that are innovative, well-supported and well-documented.

"This is their only business and they excel at it," he said.

Mini Makers Want OEM Reps To Be Sales, Applications Experts

By Dennis A. Fletcher
Special to Computerworld

Minicomputer vendors seeking OEM representatives in the turnkey business market are looking for a combination of seasoned sales personnel and experienced applications technicians, according to a survey of five such mini makers.

The survey polled Basic/Four, Cincinnati Milacron, Digital Equipment Corp., Hewlett-Packard Co. and General Automation.

In a spontaneous listing of characteristics felt to be most desirable in an OEM representative, three firms listed in-house software applications expertise and an existing competitive sales force.

Two vendors said the rep should be able to capitalize to the needed credit line.

Other criteria listed by respondents were marketing experience in small business systems; the ability to penetrate new industry areas; the courage to face risk; and business experience of three to four years.

Since these criteria were provided without prompting, it is likely that several of the respondents would have checked off these attributes had they been presented a list.

Vendors surveyed recognize the highly competitive nature of the small business turnkey mini market and the need for a strong sales force in order to succeed.

"It's a door-slamming, tire-kicking market out there," one vendor stated.

In addition, the vendors are looking for service bureaus, software houses and systems houses to supplement their rather meager supply of applications software.

In some cases, vendors want to supplement their technical force, which is inexperienced in the applications of the small commercial marketplace.

Three-Year Agreements

Those considering making OEM agreements with a mini vendor should be sure the agreement period is long enough – preferably at least three years – to ensure that the first-year investment will be recouped with a reasonable return before the agreement comes up for renegotiation.

There usually is nothing in the agreement that will bind the vendor to renew the agreement.

Fletcher is with Fletcher & Associates, a consulting firm in Altadena, Calif. He conducted the survey, whose results were given at a seminar in Los Angeles for the Association of Data Center Owners and Managers.

Earnings Reports

ADVANCED MEMORY SYSTEMS
Three Months Ended March 26

	1976	1975
Shr Ernd	$.52	$.18
Revenue	9,889,000	7,681,000
Tax Cred	651,000	210,000
Earnings	1,357,000	439,000
6 Mo Shr	.98	.30
Revenue	19,556,000	15,184,000
Tax Cred	1,208,000	360,000
Earnings	2,517,000	745,000

BURROUGHS
Three Months Ended March 31

	1976	1975
Shr Ernd	$.61	a$.59
Revenue	405,273,000	365,213,000
Earnings	24,270,000	a23,371,000

a-Restated for accounting change.

BEEHIVE MEDICAL ELECTRONICS
Three Months Ended March 31

	1976	1975
Shr Ernd	$.16	$.12
Revenue	2,978,097	2,158,570
Earnings	148,552	110,813
6 Mo Shr	.31	.23
Revenue	5,492,887	4,282,130
Earnings	289,321	213,104

COMPUGRAPHIC
Three Months Ended March 27

	1976	1975
Shr Ernd	$.95	$.79
Revenue	22,590,000	18,803,000
Earnings	1,840,000	1,446,000
6 Mo Shr	1.79	1.51
Revenue	44,226,000	36,735,000
Earnings	3,441,000	2,757,000

CONRAC
Three Months Ended March 31

	1976	1975
Shr Ernd	$.85	a$.56
Revenue	27,626,000	21,009,000
Earnings	1,145,000	a753,000

a-Restated.

DATA DOCUMENTS
Three Months Ended March 31

	1976	1975
Shr Ernd	$1.66	$1.78
Revenue	18,349,299	15,898,030
Spec Cred	.....	2,000
Earnings	777,562	836,428
6 Mo Shr	3.31	3.45
Revenue	36,474,756	31,559,510
Spec Cred	.....	5,000
Earnings	1,553,702	1,621,156

HONEYWELL
Three Months Ended March 31

	1976	a1975
Shr Ernd	$.61	.....
Revenue	648,365,000	$595,884,000
Tax Cred	1,004,000	.....
Earnings	13,553,000	1,071,000

a-Restated for accounting change.

ITEL
Three Months Ended March 31

	1976	1975
Shr Ernd	$.34	$.22
Revenue	56,100,000	38,200,000
Earnings	2,700,000	2,100,000

MEMOREX
Three Months Ended March 31

	1976	1975
Shr Ernd	$1.59	$.35
Revenue	79,419,000	6,625,000
Tax Cred	3,794,000	575,000
Earnings	9,083,000	1,583,000

MOSTEK
Three Months Ended April 2

	1976	1975
Shr Ernd	$.14	$.08
Revenue	12,573,731	14,962,895
Earnings	580,290	341,504

POSITION ANNOUNCEMENTS

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International Co. NYC HQ

Seeks DOS/VS to OS VS conversion exp 370/158-software selection-development-data base-OS internals-utilities. ALP deg nec. Excint bnft package. Career path. Career path.
$17.3 to $25,000+15%Bon

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$19-25,000+15%Bon
Call Bill Borrelli (212) 349-3610

Wm. Harris agency
150 Bway, N.Y. 10038

INSTRUCTOR
Data Processing

William Rainey Harper College has a vacancy for Fall, 1976 Formal application deadline is July 2, 1976. Send resume to:
Mr. James J. Smith
Personnel Specialist
WILLIAM RAINEY HARPER COLLEGE
Algonquin & Roselle Roads, Palatine, IL 60067.
An Affirmative Action/Equal Opportunity Employer

SYSTEMS ANALYSTS

Starting salary $17-23,000. Maryland based div of top national corp seeks programmer analyst, systems analyst and senior systems analyst for key role in design and implementation of mfg environment (IBM 360/370, OS, COBOL) Contact George Nugent. All fees pd.
FOX-MORRIS PERSONNEL CONSULTANTS
409 Washington Avenue
Towson, MD 21204

SYSTEMS PROGRAMMER

Responsible for maintaining and enhancing WYLBUR on an IBM 370/158 under MVS.
Requires knowledge of WYLBUR internals and several years of assembler language experience on IBM 360 or 370 under OS/MVT or MVS.
Send resume to Ernest Stroman
RAND
1700 Main Street
Santa Monica, Ca. 90406
An Affirmative Action Employer M/F

FACULTY POSITION

Qualifications: Ph.D. in Computer Science, Electrical Engineering or equivalent. Teaching and industrial experience desirable. Area of teaching and research specialization should include electronics, microprocessors, and minicomputers.
Rank and salary dependent on qualifications and experience.
Send application including resume, three confidential letters of reference, and undergraduate and graduate transcripts to: Dr. Robert C. Etherton, Chairman, Dept. of Physics, Astronomy, and Computer Science, Box 2109, University Station, Murray State University, Murray, KY 42071.
Applications received after June 22, 1976 may not be considered.
Murray State University is an Equal Opportunity Employer, M/F and encourages applications from all qualified persons.

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Director of Data Processing
Black Hawk College

Responsibilities: Management of systems development, operations, and service center serving academic, administrative support, and external educational and commercial users. College utilizes large scale third generation, multiprogramming, time sharing computer with on-line and batch applications.
Qualifications: Extensive experience in development of management information systems. Strong managerial abilities and communications skills. Project management capabilities and analytical abilities essential. Bachelors degree required. Minimum three years supervisory experience in data processing necessary.
Submit confidential resume including work experience, accomplishments, education and salary history to Robert L. Dan, Vice President for Administration and Finance, Black Hawk College, 6600 - 34th Avenue, Moline, Illinois 61265. Application deadline July 1, 1976.
An Equal Opportunity, Affirmative Action Employer

Process Control Specialist
STEEL INDUSTRY

New York area office of multi-national firm requires Process Control Engineer having educational background in computer sciences
Duties require foreign and domestic travel in connection with application of computer process control to basic steel industry plant facility. Experience with mathematical modeling, programming, and industrial hardware and software required
Salary commensurate with experience
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WNY client is seeking mfg systems Pro. Large industry bkgd req'd - min 5 yrs exp in mktg, sales analysis & order processing. Data base a plus. IBM COBOL installation. Degree req'd. $18K (fee paid) Contact P. Siegal (in confidence).

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Buffalo, N.Y. 14202
(716) 842-0801

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Partial List of Current Vacancies

	TO
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Sys Progs CICS VS-2	23K
Sr. Sys. Analyst CICS	20K
Sr. Sys. Analyst IMS	20K
Applications Progs CICS-BAL	18K
Applications Progs CICS-COBOL	18K
Prog Analyst COBOL CICS	17K
Prog Analyst COBOL IMS	17K

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Bill Denny-EDP Div-CW
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320 Interstate No. Suite 100
Atlanta, Ga. 30339

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Director, Computer Center
State University College
Oneonta, NY 13820
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Faculty Positions in Computer Science

State University of New York
College at Brockport

Positions are available in the Department of Computer Science for Fall 1976. Individuals with interests in operating systems, computer network architecture, and/or data base technology are especially encouraged to apply. Ph.D., or equivalent, is required. Candidates must have a strong commitment to undergraduate teaching. Send resume and the names and addresses of three references to:

Dr. Jerrold L. Wagener, Chairman, Personnel Committee, Department of Computer Science, State University of New York, College at Brockport, Brockport, N.Y. 14420.

The college, an Equal Opportunity Employer, encourages women and members of minority groups to apply.

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Largest bank in Montana desires Programmer Analyst, minimum 2 years Cobol. Burroughs med. system, on-line, management potential preferred. 10K to 16K. Send resume to:

T.R. Cover
P.O. Box 30918
Billings, Montana 59116

PROGRAMMERS/ SYSTEMS ANALYSTS

Immediate career opportunities are available with an established and progressive southeast Computer Service Company. Ideal candidates should have experience utilizing COBOL-BAL. Bank application experience is helpful but not required. Competitive starting salary and excellent fringe benefit program. Send confidential resume to:

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Personnel Department
P.O. Box 10566
Birmingham, AL 35296
Equal Opportunity Employer

PROGRAMMERS

Hardee's Food Systems, Inc., a $175 million fast food industry leader with corporate headquarters in North Carolina, has immediate openings in its Information System's Department for two programmers. Position requires at least 2 years experience in COBOL programming. Full company paid benefits. Promotional opportunities. Salary commensurate with experience. Send resume and salary requirements to:

Dick Nelms
Director of Employment
Hardee's Food Systems, Inc.
P.O. Box 1619
Rocky Mt., N.C. 27801
EOE

Data Processing Systems Analyst

Chicago-based railroad seeks systems analyst with 2-3 years' experience to design, develop and implement accounting applications. Scope of projects include manual and computerized systems. Candidate needs strong analytical and versatile technical skills. Some travel. Excellent salary and fringe benefits. Send resume to

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The University of Alabama in Birmingham invites applications for the position of Director of the Central Computing Facility who reports to the Assistant to the President for Computer Affairs.

The Center provides both academic and administrative computing services to the campus, including systems design and programming for the administrative users and education and consulting for the academic users. Current equipment includes a 3MB 370/158 operating under OS/VS2. Major software includes IMS, CICS and TSO.

Required qualifications are:
1. Previous management experience in a computing center with a 370/145 or larger.
2. Experience with IBM teleprocessing and time-sharing systems.

Highly desirable additional qualifications are:
1. Experience with IMS.
2. Experience with University administrative systems development.
3. M.S., MBA or Ph.D. degree.

Deadline for application receipt is May 24, 1976.
Apply to: Personnel Office, University of Alabama in Birmingham, Birmingham, AL 35294.
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DATA PROCESSING PROFESSIONAL

A major U.S. financial institution is seeking a highly qualified individual with at least 5 years data processing background for management position. Should have experience in controlling computer projects from feasibility through implementation – a familiarity with teleprocessing techniques/tape and disk data processing environments.

Will require travel and relocation with responsibility for business development in assigned countries. Must possess good presentation skills in Arabic/English. Salary commensurate with experience. Send resume and salary history to:

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Professional Placement
F.C. 2-2-5 P.O. Box 7618
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Immediate opening for a Systems Programmer to assume responsibility for the operational system on a 370 DOS/VS with POWER and ITF.

Other duties will include instruction of Operators and Programmers in the best utilization of the system on new and existing applications.

Experience: 3-5 plus years in Data Processing with 2 plus years as a Systems Programmer.

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East: Boston (617/237-3120), New York-New Jersey (201/687-8700), Philadelphia (215/665-1717), Washington, D.C. (703/790-5610).

Midwest: Chicago (312) 782-0857), Cleveland (216/771-2070), Detroit (313/352-6520), Kansas City (816/474-3393), Minneapolis (612/543-3600), St. Louis (314/862-3800).

South & Southwest: Atlanta (404/634-5127), Dallas (214/638-4080), Forth Worth (817/338-9300), Houston (713/626-8705), New Orleans (504/523-2576).

West Coast: Los Angeles (213/386-5500), Irvine, CA. (714/833-1730), Palo Alto (415/328-7155), San Francisco (415/434-2410).

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Mgrs. Syst & Progrmg Min. 2 years Mgmt.	$18-26K

For further information on these and other positions, send resume in strict confidence to:

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COMMUNICATIONS SOFTWARE DEVELOPMENT

These positions entail systems design and development of software for large custom communications systems. A minimum of 2 years of directly related experience in the development of communications, software and strong minicomputer background is required. A related BS degree is preferred.

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NCR *Special Systems Division*

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Cleveland, Ohio 44114
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Data Processing Careers, Inc.
Suite 1109
Stemmons Tower West
Dallas, Texas 75207
DETROIT
Electronic Systems Personnel
1705 Fisher Building
Detroit, Michigan 48202
FLORIDA
Data Sciences Personnel, Inc.
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Miami, Florida 33169
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Hartford, Connecticut 06105
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801 Nicollet Mall, Suite 1716
Minneapolis, Minnesota 55402
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405 Lexington Avenue
New York, New York 10017
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106 Lawyers Building
428 Forbes Avenue
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10 Dorrance Street
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The Computer Resources Group Agency, Inc.
303 Sacramento Street
San Francisco, California 94111
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2530 James Street
Syracuse, New York 13206
TULSA
Data Processing Careers, Inc.
Suite 10, Park 21 Building
2626 East 21st Street
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Oakland, Ca. 95660
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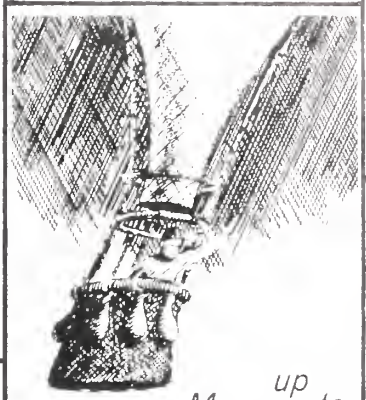

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INVITATION TO BID

Sealed Bids will be received in the Montgomery County Purchasing Office, Room 114, County Office Bldg., Rockville, MD 20850, until 2:00 p.m. on Friday, June 11, 1976, for third-party lease, lease purchase, installment plan purchase or straight purchase of computer hardware consisting of an IBM 370/145 J2 computer and associated peripheral equipment.

A Pre-Bid Conference will be held on Wednesday, May 26, 1976, at 10:00 a.m., in the 1st Floor Auditorium of the COB. Bid opening will be in Room 114 of the COB on Friday, June 11, 1976 at 2:00 p.m.

The Invitation to Bid will be available, after May 10, in Room 114. Bid Bond of $3,000 will be required.

For further information, contact the Montgomery County Purchasing Office – Mrs. M. Weaver, Purchasing Agent – 279-1466.

Prime Quarter Earnings Jump Sevenfold

FRAMINGHAM, Mass. – Prime Computer, Inc.'s first-quarter earnings increased more than sevenfold on a 78% rise in revenues for the period ended April 4.

The quarter's results are "on plan for making our 1976 forecast," according to President Kenneth G. Fisher.

"I continue to believe the combination of a strong economy, a strong industry demand and a dedicated organization will assure meeting our projections for the year," he stated.

The projections include sales of over $18 million and earnings of more than $2 million with gross margins of better than 50%.

During the quarter, earnings jumped from $52,000 or 3 cents a share in the year-ago period to $365,000 or 16 cents a share.

Tax credits were $177,000 in the 1976 quarter compared with $27,000 in the 1975 period. Income before credits also rose sevenfold.

Revenues climbed to nearly $4 million from $2.2 million in the year-ago period. During the quarter the firm began shipments of its largest system, the Prime 400.

Among Prime's objectives for 1976 are completing reorganization and doubling the size of the domestic sales force, generating a higher proportion of total sales in the U.S. and increasing emphasis on business systems in market segments not dominated by IBM, Fisher said in the annual report.

Plans call for engineering and manufacturing to develop new models and additional methods for handling large data files.

Prime will not require outside capital in excess of that available through its existing bank line, Fisher said. Last year the firm increased its line of credit with the First Pennsylvania Bank of Philadelphia. That line, for $7 million, expires Dec. 31, 1977.

The company plans to more than double its facility here with a 70,000 sq-ft expansion.

EMM Finds First Period 'Encouraging'

LOS ANGELES – "Financial results for the first quarter of 1976 were encouraging," Trude C. Taylor, Electronic Memories & Magnetics Corp. (EMM) chairman, said here recently.

"Although revenues for the period were off 12% from a year earlier and off 6% from the fourth quarter of 1975, operating profits were restored," he said.

The operating results before special credits were $706,000 compared with the year-ago loss of $197,000.

Earnings, aided by a $3.8 million gain after taxes on the sale of a portion of its holdings of Sycor, Inc., totaled nearly $4.2 million compared wtih a loss of $394,000 in the year-ago period.

However, after dividend requirements on preferred stock, the earnings were $3.9 million or 72 cents a share compared with a loss of $657,000 or 12 cents a share.

Revenues dropped to $20.8 million from $23.7 million in the same period of 1975.

"Order input for most of our products and, in particular, core memories and permanent magnets continued an upward trend during the first quarter," Taylor said.

"We expect this trend will continue as we benefit from the recovering economy and by more increases in capital equipment manufacturing rates.

"We continue to be pleased with our semiconductor memory operations. We are finding excellent demand for the Semi 4K bit static memory components and memory systems.

"The manufacturing rate of our end-user add-on memories compatible with the IBM 370/158 computer is increasing. The 4K Semi is the memory device utilized in this product," he said.

EMM's bank debt was fully paid with the cash proceeds from the Sycor stock sale.

Sycor Results Up In First Quarter

ANN ARBOR, Mich. – Sycor, Inc. scored increased levels of revenue and earnings during the first quarter ended March 28.

Revenues rose 41% to $15.8 million compared with $11.2 million for the comparable 1975 period.

Earnings before benefit of tax loss carryforward combined to $1.2 million or 42 cents a share from the $835,000 or 30 cents a share in the year-ago quarter.

Earnings edged upwards to nearly $1.24 million or 42 cents a share compared with $1.2 million or 44 cents a share in the same period a year ago, when there was a $382,000 tax credit.

On March 30 Sycor completed an equity offering to the public of 541,026 shares of common stock with proceeds after expenses of $13.7 million.

Tax Credit Dip Hurts Data 100 Net

MINNEAPOLIS – Although Data 100 Corp.'s income before special credits rose in the first quarter over that of a year ago, earnings failed to keep pace because of a smaller tax credit in the 1976 quarter.

Earnings for the period totaled $946,000 or 20 cents a share compared with nearly $1.4 million a year ago.

Tax credits were $126,000 compared with $580,000, respectively.

Revenues, including $5 million in nonrecourse sales to third-party leasing companies, rose to $29.3 million compared with $20.9 million in the same quarter last year.

The first quarter reflected for the first time the inclusion of the acquisition of Iomec, Inc.

Shipments of terminal equipment to end users during the quarter were up over those of the 1975 first quarter, according to Edward D. Orenstein, Data 100 president.

The firm's order rate and backlog have been increasing steadily since year-end 1975, he said.

The Keybatch product now accounts for about 50% of net shipments in North America, he added.

NCSS Increases Year Earnings 18%

NORWALK, Conn. – National CSS, Inc.'s (NCSS) earnings rose 18% in the year and 39% in the fourth quarter ended Feb. 29 compared with year-ago periods.

For the quarter, earnings reached $620,000 or 54 cents a share compared with $447,000 or 41 cents a share in the same period last year.

Revenues totaled $9.3 million compared with $7.9 million.

During the year, NCSS earned nearly $2.2 million or $1.95 a share compared with $1.8 million or $1.67 a share last year.

Revenues rose to $35.6 million compared with $32.6 million last year.

New Registrations

TEKTRONIX, INC., 14150 S.W. Karl Braun Drive, Tektronix Industrial Park, Beaverton, Ore. 97077, an electronic display and measurement equipment firm, filed to register 400,000 shares of common to be offered for sale by M.J. Murdock Charitable Trust through underwriters headed by Lehman Brothers, Inc., One William St., New York, N.Y. 10004.

APPLIED DEVICES CORP., 60 Plant Ave., Hauppauge, N.Y. 11787, maker of computer-controlled data entry devices, filed to register 202,000 shares of common to be issued in conjunction with the merger of Applied Devices and Datatrol, Inc., with each outstanding share of Datatrol common (other than those shares presently held by Applied Devices) being converted into about .18519 share of Applied Devices common stock. No underwriters are involved.

INFORMATION INTERNATIONAL, INC., 5933 Slauson Ave., Culver City, Calif. 90064, a computer graphics data input and output systems manufacturer, filed to register 91,500 shares of common to be exchanged by certain shareholders for limited partnership interests in Vance Sanders Exchange Fund at an exchange rate to be determined by the market price of the stock at the time of the exchange. No underwriters are involved.

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COMPUTERWORLD Computer Stocks Trading Indexes

Earnings Reports

GENERAL COMPUTER SYSTEMS
Six Months Ended Dec. 31

	1975	1974
Shr Ernd	.....	$.25
Revenue	$4,840,746	6,007,177
Earnings	(916,992)	443,785

HAZELTINE
Year Ended Dec. 31

	1975	1974
Shr Ernd	$.67	.....
Revenue	85,258,000	$96,602,000
Spec Item	a100,000	b(680,000)
Earnings	1,308,000	(2,360,000)
3 Mo Shr	1.13	....
Revenue	24,457,000	25,505,000
Tax Cred	100,000	.....
Earnings	2,216,000	2,006,000

a-Tax-loss carryforward. b-Cumulative effect of accounting method change for preproduction and computer software costs.

KEYDATA
Three Months Ended Jan. 31

	1976	1975
Shr Ernd	$.10	$.04
Revenue	145,000	56,000
Tax Cred	127,000	46,000
Earnings	272,000	102,000
6 Mo Shr	.18	.05
Revenue	7,346,000	6,412,000
Tax Cred	224,000	61,000
Earnings	481,000	136,000

MCI COMMUNICATIONS
Nine Months Ended Dec. 31

	1975	1974
Revenue	$18,373,000	$3,980,000
Loss	a19,945,000	23,108,000

a-After a $1.5 million gain from sale of interest in CML Satellite Corp.

MICRODATA
Three Months Ended Feb. 29

	1976	1975
Shr Ernd	$.34	$.12
Revenue	6,255,064	3,417,502
Tax Cred	.....	18,000
Earnings	587,471	193,664
6 Mo Shr	.59	.03
Revenue	11,157,097	6,859,237
Tax Cred	.....	18,000
Earnings	1,001,288	45,959

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Computerworld Stock Trading Summary

TRADE*QUOTES

CLOSING PRICES WEDNESDAY, MAY 12, 1976

All statistics compiled, computed and formatted by TRADE★QUOTES, INC. Cambridge, Mass. 02139

COMPUTER SYSTEMS

EXCH		1976 RANGE (1)	CLOSE MAY 12 1976	WEEK NET CHNGE	WEEK PCT CHNGE
N	BURROUGHS CORP	84-108	102 3/8	+ 1/2	+0.4
O	COMPUTER AUTOMATION	10- 19	17	+ 5/8	+3.8
N	CONTROL DATA CORP	18- 27	23 1/8	+1 3/8	+6.3
N	DATA GENERAL CORP	40- 59	55 1/2	+2 1/4	+4.2
O	DATAPOINT CORP	24- 45	44 3/4	+5 1/4	+13.2
O	DIGITAL COMP CONTROL	2- 4	3 5/8	+ 1/4	+7.4
N	DIGITAL EQUIPMENT	138-181	165 1/8	+2 3/8	+1.4
N	ELECTRONIC ASSOC.	2- 5	3 1/8	- 1/8	-3.8
A	ELECTRONIC ENGINEER.	7- 16	14 5/8	0	0.0
N	FOXBORO	28- 41	40 3/8	+1 3/8	+3.5
O	GENERAL AUTOMATION	5- 11	9 3/4	- 7/8	-9.0
O	GRI COMPUTER CORP	1- 1	1/2	0	0.0
N	HEWLETT-PACKARD CO	95-117	111	+4 5/8	+4.3
N	HONEYWELL INC	34- 56	46 3/8	+2 5/8	+6.0
N	IBM	227-272	257	+7	+2.7
O	MANAGEMENT ASSIST	1- 3	2 1/4	+ 1/8	+5.8
O	MEMOREX	18- 33	30 1/4	+1 1/4	+4.3
O	MICRODATA CORP	10- 26	22 1/4	+1 3/4	+8.5
O	MODULAR COMPUTER SYS	9- 13	10	+ 3/4	+8.1
N	NCR	24- 31	29 1/4	+2 1/2	+9.3
O	PRIME COMPUTER INC	4- 11	9 1/2	+ 1/4	+2.7
N	PERKIN-ELMER	20- 27	20	- 1/4	-1.2
N	RAYTHEON CO	45- 54	54 3/8	+3 1/4	+6.3
N	SPERRY RAND	40- 50	49 1/4	+1 5/8	+3.4
O	SYCOR INC	20- 31	28 1/2	+4	+16.3
A	SYSTEMS ENG. LABS	6- 10	8 3/4	+ 1/4	+2.9
N	VARIAN ASSOCIATES	13- 17	15 1/4	+1	+7.0
A	WANG LABS.	11- 20	13 1/2	+ 3/8	+2.8

LEASING COMPANIES

EXCH		1976 RANGE (1)	CLOSE MAY 12 1976	WEEK NET CHNGE	WEEK PCT CHNGE
O	COMDISCO INC	3- 10	7 3/4	0	0.0
A	COMMERCE GROUP CORP	2- 3	2 5/8	- 1/8	-4.5
A	COMPUTER INVSTRS GRP	1- 3	1 3/4	- 1/8	-6.6
M	DATRONIC RENTAL	1- 1	3/4	0	0.0
A	DCL INC	1- 1	3/4	-	-7.7
N	DPF INC	5- 7	5 5/8	- 3/8	-6.2
O	EDP RESOURCES	1- 1	1	0	0.0
A	GREYHOUND COMPUTER	3- 8	7 1/2	+ 3/8	+5.2
N	ITEL	6- 13	12	+ 5/8	+5.4
N	LEASCO CORP	6- 14	11 5/8	- 7/8	-7.0
O	LEASPAC CORP	1- 1	1/4	0	0.0
O	NPG INC	1- 1	3/4	0	0.0
A	PIONEER TEX CORP	6- 9	7 7/8	+ 1/4	+3.2
N	U.S. LEASING	7- 12	10 1/2	+ 1/2	+5.0

EXCH: N=NEW YORK; A=AMERICAN; P=PHIL-BALT-WASH
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SOFTWARE & EDP SERVICES

EXCH		1976 RANGE (1)	CLOSE MAY 12 1976	WEEK NET CHNGE	WEEK PCT CHNGE
O	ADVANCED COMP TECH	1- 2	1 1/2	0	0.0
A	APPLIED DATA RES.	2- 3	2 7/8	0	0.0
N	AUTOMATIC DATA PROC	54- 67	65 1/4	+3 5/8	+5.8
O	BRANDON APPLIED SYST	1- 1	1/8	0	0.0
O	COLEMAN AMERICAN COS	4- 6	4 5/8	- 1/4	-6.4
O	COMPUTER DIMENSIONS	3- 7	5 3/4	+ 7/8	+17.9
O	COMP ELECTION SYSTMS	5- 9	9 3/4	+1 1/4	+16.6
O	COMPUTER HORIZONS	1- 2	1 3/4	0	0.0
O	COMPUTER NETWORK	2- 6	5 1/4	- 1/8	-2.3
N	COMPUTER SCIENCES	4- 8	6 3/4	+ 1/2	+8.0
O	COMPUTER TASK GROUP	1- 1	1	0	0.0
O	COMPUTER USAGE	3- 6	3 1/2	- 1/8	-3.4
O	COMSHARE	2- 7	5 3/4	- 1/2	-8.0
O	DATATAB	1- 1	1	0	0.0
A	ELECT COMP PROG	1- 1	1/2	0	0.0
N	ELECTRONIC DATA SY.	12- 15	13 1/8	-1 1/4	-8.6
O	INFONATIONAL INC	1- 1	1/8	0	0.0
O	IPS COMPUTER MARKET.	1- 2	1 1/8	0	0.0
O	KEANE ASSOCIATES	2- 4	3	- 1/8	-4.0
O	KEYDATA CORP	3- 5	2 1/2	- 1/4	-9.0
O	LOGICON	4- 4	3 7/8	- 1/8	-3.1
A	MANAGEMENT DATA	1- 3	2 1/2	0	0.0
A	NATIONAL CSS INC	13- 25	20	+ 3/4	+3.8
A	ON LINE SYSTEMS INC	18- 22	20 1/4	+1 1/8	+5.8
N	PLANNING RESEARCH	3- 5	3 1/4	0	0.0
O	PROGRAMMING & SYS	1- 1	1/2	0	0.0
O	RAPIDATA INC	3- 5	3 1/8	+ 1/4	+8.6
O	REYNOLDS & REYNOLDS	13- 21	18	0	0.0
O	SCIENTIFIC COMPUTERS	1- 1	3/4	0	0.0
O	SIMPLICITY COMPUTER	1- 1	1	0	0.0
O	TYMSHARE INC	19- 28	27	+2	+8.0
A	UPS SYSTEMS	3- 5	3 3/4	+ 1/4	+7.1
N	WYLY CORP	3- 7	4	- 1/4	-5.8

PERIPHERALS & SUBSYSTEMS

EXCH		1976 RANGE (1)	CLOSE MAY 12 1976	WEEK NET CHNGE	WEEK PCT CHNGE
N	ADDRESSOGRAPH-MULT	8- 13	9 1/2	+ 1/2	+5.5
O	ADVANCED MEMORY SYS	4- 10	8 1/2	+1 5/8	+23.6
N	AMPEX CORP	5- 8	7 3/4	+ 1/2	+6.8
O	ANDERSON JACOBSON	2- 4	3	- 1/8	-4.0
O	BEEHIVE MEDICAL ELEC	3- 6	5 5/8	+ 3/8	+7.1
A	BOLT, BERANEK & NEW	7- 10	8 1/4	+ 3/8	+4.7
N	BUNKER-RAMO	5- 7	5 7/8	+ 3/8	+6.8
A	CALCOMP	4- 7	4 3/4	+ 1/4	+5.5
O	CAMBRIDGE MEMORIES	2- 6	3 5/8	- 1/4	-6.4
N	CENTRONICS DATA COMP	20- 36	32	-2 1/2	-7.2
O	CODEX CORP	22- 42	36 1/2	+3	+8.9
O	COGNITRONICS	1- 1	7/8	- 1/8	-12.5
O	COMPUTER COMMUN.	1- 5	4 1/2	- 3/8	-7.6
O	COMPUTER CONSOLES	4- 6	5 1/4	- 1/4	-4.5
A	COMPUTER EQUIPMENT	1- 3	2	0	0.0
O	COMPUTER TRANSCEIVER	1- 3	1 1/4	0	0.0
O	COMTEN	4- 9	8	+ 1/8	+1.5
N	CONRAC CORP	20- 25	23 3/8	- 1/8	-0.5
O	[illegible] SYSTEMS	1- [illegible]	3 1/4	[illegible]	0.0
O	DATA 100	7- 13	11	+1 5/8	+17.3
A	DATA PRODUCTS CORP	[illegible]- 11	[illegible]	0	0.0
O	DATA TECHNOLOGY	1- [illegible]	1 3/4	0	0.0
O	DATUM INC	1- [illegible]	[illegible]	[illegible]	0.0
O	[illegible] DATA [illegible]	[illegible]	1 3/4	- [illegible]	-17.6
O	DELTA DATA SYSTEMS	1- 1	[illegible]	[illegible]	0.0
O	[illegible]	1- 1	1	[illegible]	0.0
N	[illegible]	1- [illegible]	[illegible] 7/8	+ 1/8	+4.5
O	[illegible]	1- [illegible]	[illegible]	+ 1/8	+16.6
O	[illegible]	1- [illegible]	1	[illegible]	0.0
N	HAZELTINE CORP	[illegible]- 1[illegible]	[illegible]	+1 3/8	+16.4
N	[illegible]	34- 47	44 3/4	+ [illegible]/8	+1.4
A	[illegible]	[illegible]	14 1/4	+ 1/2	+3.6
O	[illegible]	[illegible]- 7	5 [illegible]/4	+ 1/8	+2.3
O	INFORMATION [illegible]	10- 18	14 7/[illegible]	0	0.0
O	[illegible]	[illegible]-10[illegible]	75	+4	+5.6
A	[illegible]	[illegible]- 7	4 1/[illegible]	- 1/4	-5.2
O	[illegible] DATA [illegible]	[illegible]- 7	6 5/8	+ 1/4	+3.9
A	[illegible]	1[illegible]- [illegible]	1[illegible] 3/4	- 7/8	-4.9
N	[illegible]	3- 7	[illegible] 1/2	+ 3/8	+7.3
O	[illegible]	1- [illegible]	1/2	0	0.0
O	[illegible]	1- [illegible]	2 5/8	+ 1/8	+5.0
A	[illegible]	[illegible]	[illegible]	[illegible]	0.0
A	[illegible]	[illegible]	1 3/4		0.0
O	[illegible]	7- 1[illegible]	[illegible] 1/2	- 1/2	-7.1
O	[illegible]	4- [illegible]	4 [illegible]	- 1/8	-2.5
O	[illegible]	[illegible]- 11	1[illegible] 1/8	+1 1/8	+12.9
N	[illegible]	[illegible] 11	1[illegible]	+ [illegible]/8	+6.2
O	[illegible] DATA	[illegible]	[illegible] 1/4		0.0
O	STORAGE TECHNOLOGY	[illegible]- 13	1[illegible] [illegible]/4	+1 3/4	+16.4
O	[illegible]	[illegible]	[illegible]		0.0
O	TALLY [illegible]	4 [illegible]	4 7[illegible]	+ 1/4	+5.4
O	[illegible]	3- [illegible]	4	- 1/4	-5.9
N	TEKTRONIX INC	[illegible]	[illegible]	+3	+5.2
N	[illegible]	[illegible]- 5	[illegible]	- 1/8	-3.5
O	[illegible]	11- 22	1[illegible] 1/[illegible]	- 1/4	-1.5
O	[illegible]	2- 2	2	0	0.0

SUPPLIES & ACCESSORIES

EXCH		1976 RANGE (1)	CLOSE MAY 12 1976	WEEK NET CHNGE	WEEK PCT CHNGE
O	[illegible]	1- [illegible]	[illegible]	- [illegible]	-13.[illegible]
O	[illegible]	4- [illegible]	4 1/[illegible]	- [illegible]	-[illegible].5
A	[illegible]	5- 1	[illegible]	- [illegible]/8	-4.4
O	[illegible]	1 [illegible]	[illegible]/[illegible]	[illegible]	0.0
A	DATA DOCUMENTS	[illegible]	[illegible] 1/[illegible]	- 1/4	-0.6
O	[illegible]	1[illegible]- [illegible]	17 7/[illegible]	- 1/8	-0.6
N	[illegible]	[illegible]	[illegible]	+ 1/[illegible]	+1.9
O	GRAHAM MAGNETICS	[illegible]- 1[illegible]	9	+ 1/2	+5.8
O	GRAPHIC CONTROLS	13- 1[illegible]	1[illegible] 1/2	+ 1/4	+1.3
N	3M COMPANY	[illegible]- [illegible]	[illegible]	[illegible]	0.0
O	MOORE CORP LTD	[illegible]- 51	[illegible] 1/4	- 1/4	-0.5
N	NASHUA CORP	11- 17	1[illegible] [illegible]/4	+ 3/8	+2.2
O	STANDARD REGISTER	15- 19	16 1/[illegible]	+ 1/4	+1.5
O	TAB PRODUCTS CO	[illegible]	7 1/4	[illegible]	0.0
N	UARCO	[illegible]1- 25	[illegible]2 5/[illegible]	- 3/8	-1.6
O	VANIER GRAPHICS CORP	[illegible] 8	6 1/2	- 1/4	-3.7
A	WABASH MAGNETICS	4- [illegible]	6 3/8	- 3/8	-5.5
N	WALLACE BUS FORMS	19- 25	22 1/2	- 3/8	-1.6

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